OPERATING AND MAINTENANCE

MANUAL

ISSUE C

Radar & IF

MODELS

Radar & IF

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OPERATING AND MAINTENANCE

MANUAL

ISSUE C

Radar & IF

Vari-Sweep

Models

Radar & IF

(Model RADAR, catalog 865-AW)

KAY ELECTRIC COMPANY

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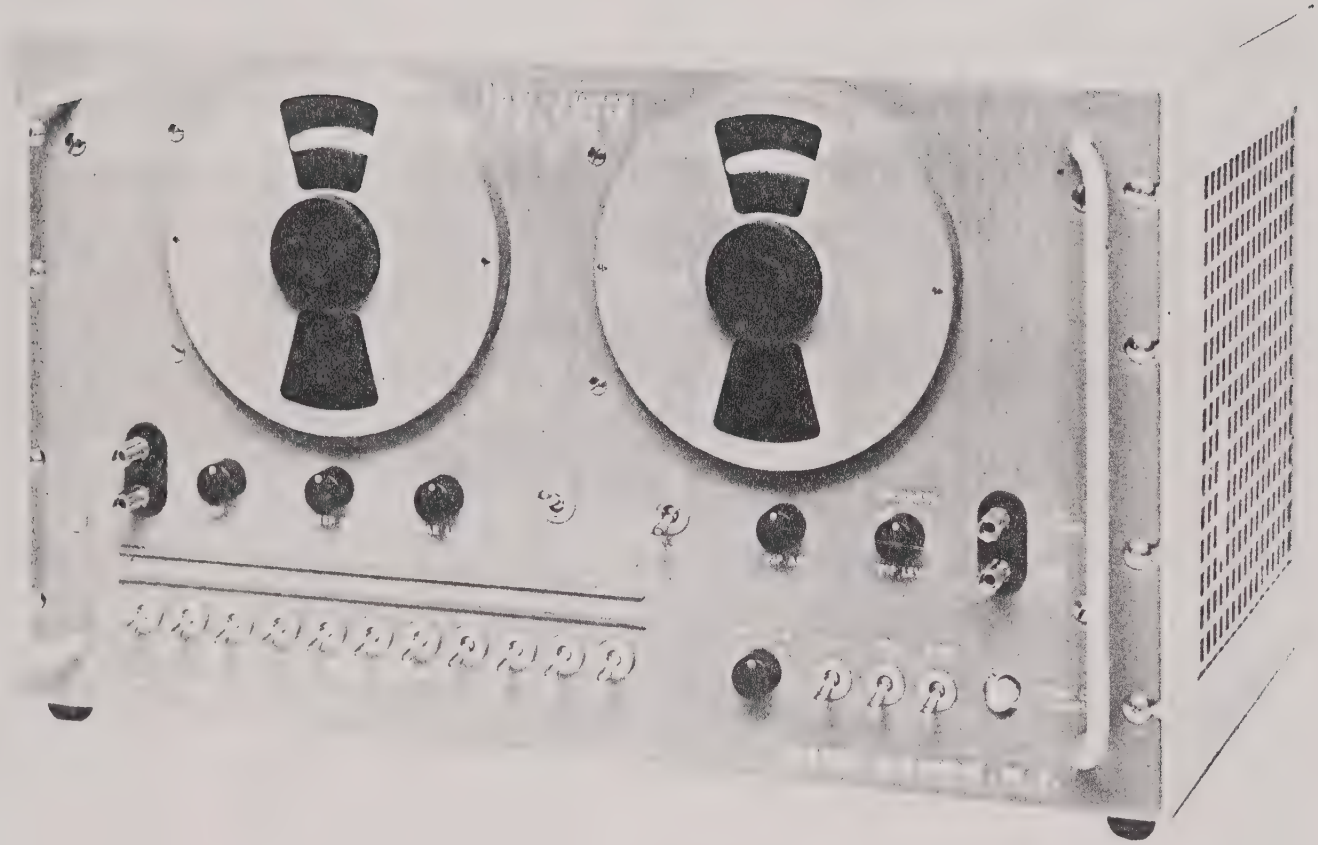


Fig. I-1, VARI-SWEEP MODEL IF

SECTION I
GENERAL DESCRIPTION

1-1 APPLICATION.

The VARI-SWEEP MODELS RADAR and IF are complete sweeping oscillators and frequency marker generators designed for testing and aligning a wide variety of circuitry and components. In conjunction with an oscilloscope, they may be used to obtain a pictorial indication of the frequency response characteristics of the circuit or component under test.

1-2 FEATURES.

These instruments utilize variable permeability techniques in a completely electronic circuit to generate a linear sweeping output. Center frequency may be set anywhere from 10 to 145 Mc in the MODEL RADAR (catalog 865-A), from 4 to 120 Mc in the MODEL IF (catalog 866-A), and from 10 to 130 Mc in the MODEL RADAR (catalog 865AW). These sweeping oscillators cover the frequency range in six, switched, overlapping bands with direct-reading, individually calibrated frequency dials. The fundamental r-f output is held constant over the range by fast-acting agc circuits.

In the MODEL RADAR and MODEL IF, for frequencies below 50 Mc, the sweep width is continuously variable to at least 60% of the center frequency; above 50 Mc, with the sweep width control at maximum, the minimum sweep width is at least 30 Mc. In the MODEL RADAR (cat. 865AW) the sweep width has been extended to provide a 70 Mc wide sweep at 130 Mc. In special models wider sweep widths may be provided.

To avoid phasing problems, a single symmetrical sawtooth voltage is used both as a horizontal deflection signal for the oscilloscope and to frequency modulate the sweeping oscillator. To provide a clear, zero-voltage reference baseline on the scope, the negative portion of the square-wave output of V-2 is used to disable the sweeping oscillator on alternate half-cycle operation. A variable r-f control and switchable attenuators provide a range of amplitude control.

A cathode-follower mixing circuit has been incorporated in the VARI-SWEEP MODEL RADAR (cat. 865AW). It provides for the internal mixing of the detected sweep output with the pip markers, making it unnecessary to use a separate cable connection between the oscilloscope and the pip output. This is desirable in applications where the addition of the marker pips to the scope would load the detected sweep output.

The standard versions of the VARI-SWEEP MODELS RADAR and MODEL IF provide for a complement of crystal-controlled, individually switched markers. The frequencies of the markers may be selected anywhere within the operating range of the sweeping oscillator, and are specified by the purchaser when ordering an instrument. In special models, marker crystals of varied arrangements and switching, can be provided. In the VARI-SWEEP MODEL RADAR (cat. 865AW), 16 individual crystal markers are switched by a rotary switch which selects the crystal markers in varying groups. Crystal markers in all units are pulse-type markers fed directly to the vertical input of the scope. They are completely independent of the circuit under test and

neither overload the circuit nor disappear in traps or regions of low amplification. A marker INCREASE PIP LEVEL control (R-140) assures marks of a convenient height regardless of the amplitude of the sweeping frequency.

VARI-SWEEP MODELS RADAR (cat. 865-A & cat. 865AW) and VARI-SWEEP MODEL IF (cat. 866-A) include a variable frequency marker. The variable marker is generated by a separate cw oscillator (V-6, V-15) in MODEL RADAR & IF; (V-6, V-16) in MODEL RADAR (cat. 865AW) which operates at a fundamental frequency and covers the frequency range of the sweeping oscillator. A separate, individually calibrated, direct-reading frequency dial is accurate to ±1%. The variable marker is a "birdie pip" type of marker easily distinguishable from the fixed, pulse-type marks. All coupling is provided within the unit, and the variable marker is completely isolated from the r-f circuits under test. A separate VARIABLE LEVEL ADJUST control (R-100) is provided for adjusting the amplitude of the variable marker. In special models, the variable marker can be brought out as a separate cw signal source.

VARI-SWEEP MODEL IF and MODELS RADAR are designed for either rack or cabinet mounting. All operating controls are located on the front panel.

1-3 SPECIFICATIONS.

SWEEPING FREQUENCY OUTPUT.

Frequency Range: MODEL IF (cat. 866-A) - 4 to 120 mc.
MODEL RADAR (cat. 865-A) - 10 to 145 mc.
MODEL RADAR (cat. 865AW) - 10 to 130 mc.

RF Output: 1.0 volt rms into nominal 70 ohms (50 ohms upon request). Output held constant to within ±0.5 db over widest sweep and over tuning range by agc circuit.

Sweep Width: MODEL IF - Continuously variable to maximum of at least 30 mc above 50 mc and 60% of center frequency below 50 mc.
MODEL RADAR (cat. 865-A) - Continuously variable to maximum of at least 30 mc above 50 mc and 60% of center frequency below 50 mc.
MODEL RADAR (cat. 865AW) - 70 mc at 130 mc. Continuously variable to a maximun of 30 mc above 50 mc and 60% of center frequency below 50 mc.

Sweep Output: Synchronized sawtooth. Amplitude approximately 7-0 volts peak.

Repetition Rate; Variable around 60 cps; locks to line frequency.

Attenuators: Switched 20 db, 10 db, and 3 db plus continuously variable 6 db.

Zero Reference: A zero-voltage baseline is produced on the oscilloscope during display retrace time.

MARKERS: Pulse-type, crystal-controlled markers are accurate to ±0.05%.

Marker Amplitude: Continuously variable from zero to approximately 5.0 volts peak.

Variable Marker: Birdie-pip type marker, variable from 5 to 170 mc in MODELS RADAR, and 2.5 to 160 mc in MODEL IF in six switched, overlaping bands. Direct reading frequency dial accurate to within ±1%.

TUBE COMPLEMENT:

MODEL IF & MODEL RADAR (cat. 866-A & 865-A).

5718	4	6V6	1	6BK7A	1
5963	1	OA2	1	12AU7	2
6J6	1	6AU6	2	12AT7	2

MODEL RADAR (cat. 865AW).

5963	1	5718	4	6BK7A	1
6J6	1	6AU6	2	12AU7	2
6V6	1	OA2	1	12AT7	3

POWER SUPPLY: Input approx. 117 volts (±10%), 50-60 cps, 160 watts. B+ electronically regulated.

POWER SUPPLY TUBE COMPLEMENT:

6AQ5	3	6AG5	1	12AU7	1
OB2	1	5651	1		

DIMENSIONS: 12"d x 19-3/8"w x 10-7/8"h.

WEIGHT: 46 lbs.

1-4 EQUIPMENT SUPPLIED.

Vari-Sweep.

Instruction Book.

1-5 ADDITIONAL EQUIPMENT REQUIRED BUT NOT SUPPLIED.

Cathode-ray oscilloscope.

Interconnecting cables.

Additional crystals if non-standard markers are required.

SECTION II
INSTALLATION

2-1 INTRODUCTION.

The VARI-SWEEP MODELS RADAR and MODEL IF are designed for table-top operation or rack mounting and present no special installation problems. However, to insure optimum operation, the equipment should not be subjected to excessive moisture, vibration or temperature conditions. The installation should include provisions for connection to an oscilloscope, to the circuit under test, and to a 160-watt source of 117-volt (±10%), 60-cps, a-c power.

2-2 INTERCONNECTION DATA MODELS IF & RADAR (cat. 866-A & 865-A)

A. Oscilloscope Connections Fig. 2-1.

1. Connect the SWEEP OUTPUT terminals directly to the x-axis input terminals on the CRO.

2. Connect the PIP OUTPUT terminals directly to the Y-axis input terminals on the CRO. If the addition of marker signals appear to alter the shape of the response curve, the resistor shown in detail 'D' of Fig. 2-1 should be used.

B. Equipment Under Test.

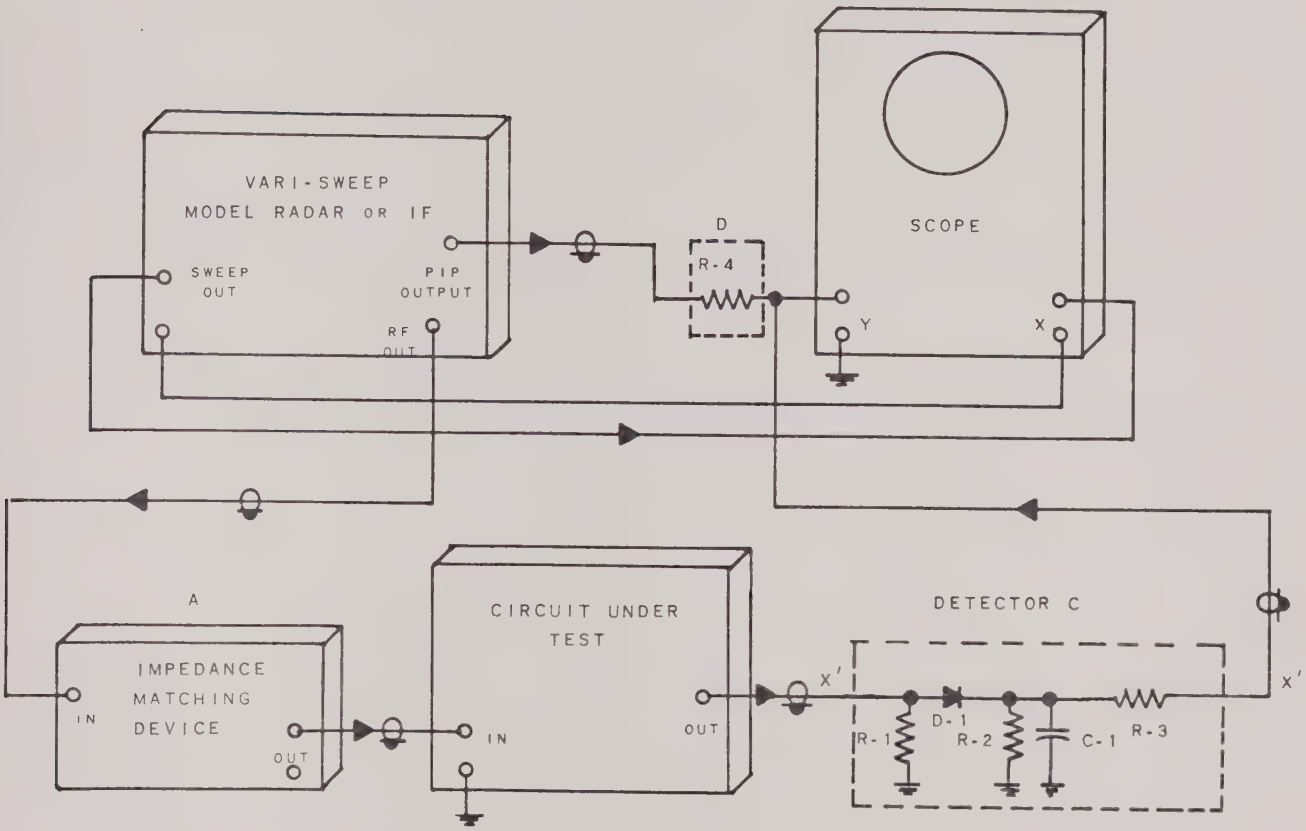
VARI-SWEEP MODEL IF & MODELS RADAR are designed to work into a 70-ohm impedance. If the input impedance of the equipment under test matches this value, connection can be made directly between the SWEEP OSCILLATOR OUTPUT jack to the circuit input. If the impedance of the circuit under test differs substantially from 70 ohms, an impedance matching network as shown in detail 'A' of Fig. 2-1 must be used. For optimum operation, the length of all interconnecting cables should be kept to a minimum.

C. Variable Frequency Marker.

A variable frequency marker is incorporated and is available at the same panel terminals as the fixed markers (J-3).

2-3 INTERCONNECTION DATA, MODEL RADAR (cat. 865AW).

MODEL RADAR 865AW differs from MODELS RADAR and IF, in that a mixer cathode-follower tube (V-15) is incorporated in the frequency marker circuit, Fig. 2-2. This permits the detected output from the circuit under test to be fed back into the VARI-SWEEP and mixed in V-15 with the fixed markers and the variable marker. This feature provides a means of capacitively coupling (C-85) the frequency markers to the CRO at a high-impedance level thus preventing alteration of the response



= COAXIAL CABLE

C-1, C-2 = 0.001μF

D-1 = G7C

R-1 = VALUE DETERMINED BY LOAD REQUIREMENT OF CIRCUIT UNDER TEST.

R-2 = 33K

R-3, R-4, R-5 = 47K

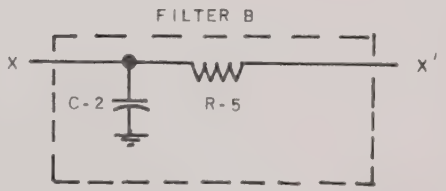


Fig. 2-1. BASIC INTERCONNECTIONS, MODELS RADAR & IF.

trace due to loading effects. Interconnections between the MODEL RADAR 865AW, the tested circuit, and associated equipment is shown in Fig. 2-3.

A. Oscilloscope Connections.

1. Connect the SWEEP OUTPUT terminals directly to the X-axis input terminals of the CRO.

2. Connect SCOPE output jack (J-4) to the vertical input of the CRO.

3. Connect the detected sweep output to DETECTOR INPUT jack (J-5).

B. Equipment Under Test.

The remaining interconnections are made in accordance with instructions contained in Section 2-2B.

C. Crystal Frequencies.

A complement of pulse-type, crystal-controlled frequency markers may be incorporated in the VARI-SWEEPS, at frequencies specified by the customer.

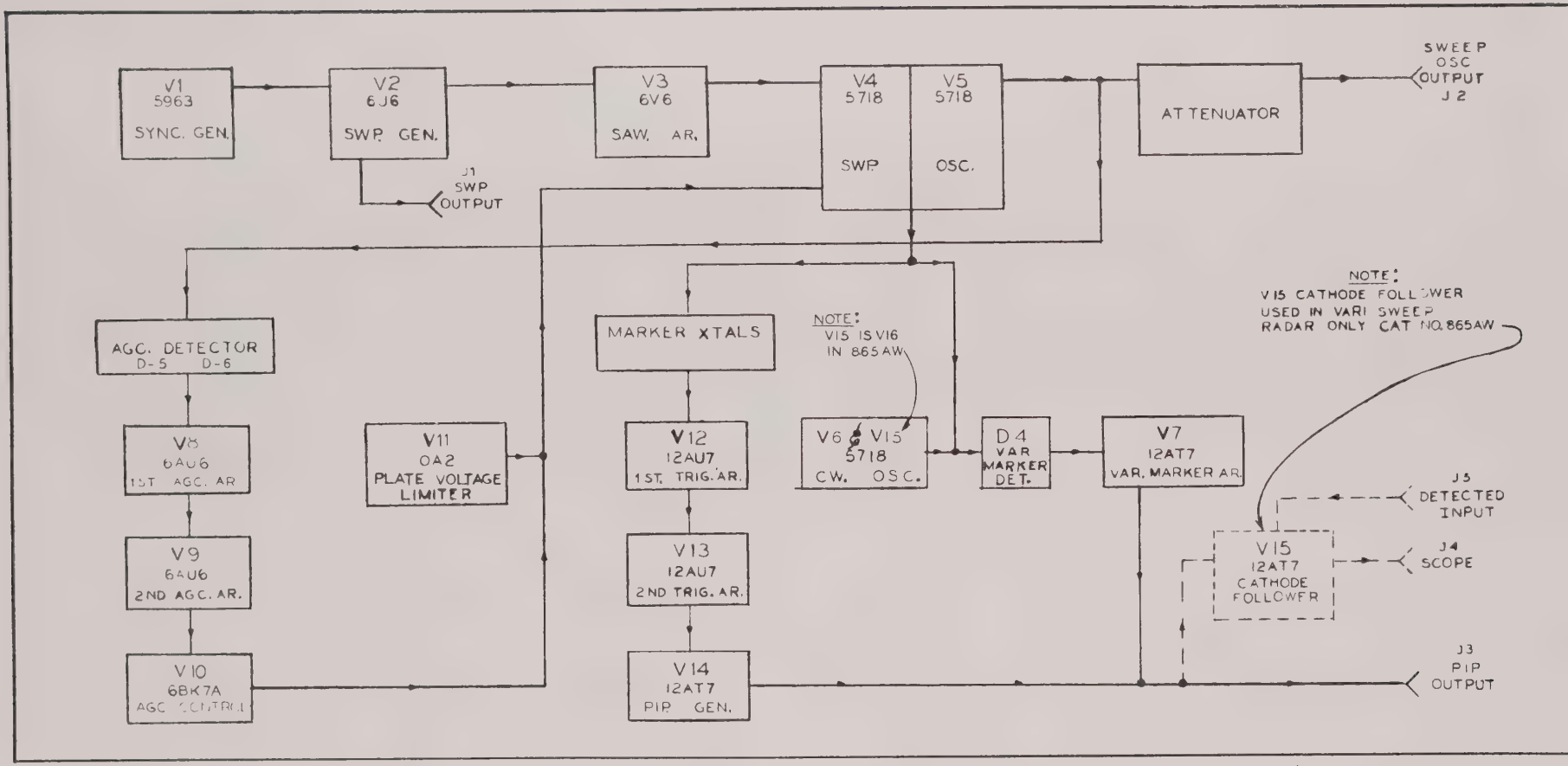
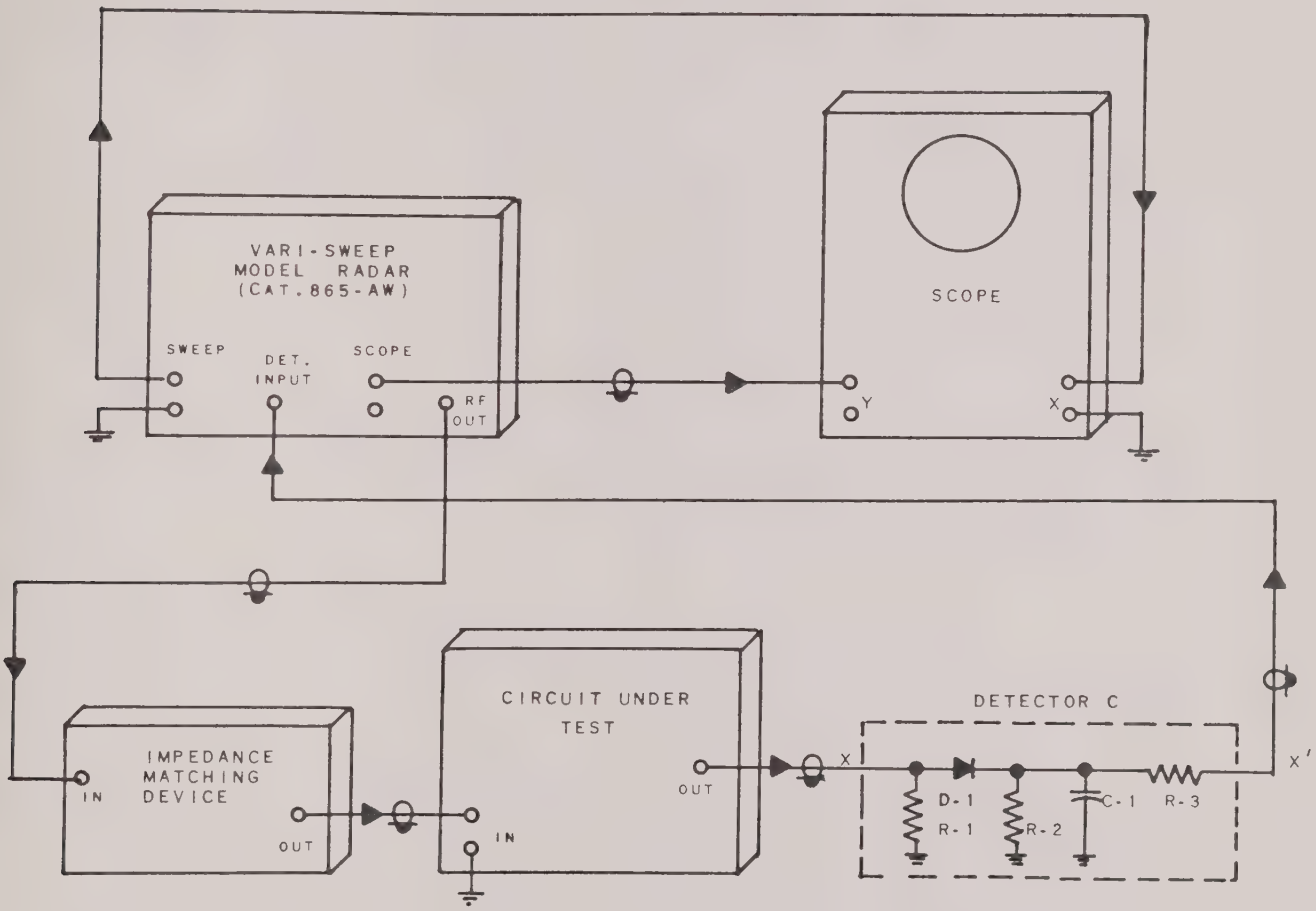


Fig. 2-2, Block Diagram, Vari-Sweep



= COAXIAL CABLE

C-1, C-2 = 0.001μF

D-1 = G7C

R-1 = VALUE DETERMINED BY LOAD REQUIREMENT OF CIRCUIT UNDER TEST.

R-2 = 33K

R-3, R-4 = 47K

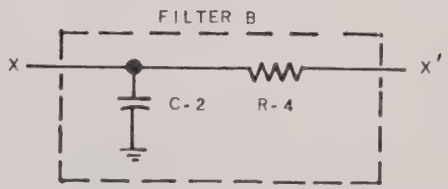


Fig. 2-3, BASIC INTERCONNECTIONS, MODEL RADAR (Cat. 865-AW).

SECTION III
OPERATION

3-1 IDENTIFICATION OF CONTROLS.

CONTROL	POSITION	FUNCTION
REP RATE (R-11)	Variable	This control provides a means of varying the sweeping repetition rate. For normal operation, the sweep rate is 'locked in' at line frequency. For special tests such as hum measurement, the repetition rate may be varied around this frequency.
PIP ADJ (R-125)	Variable	The proper setting for this front-of-panel control is a point midway between the setting at which one or more crystal-positioned markers disappear and the setting at which multiple or distorted pips appear.
PIP LEVEL (R-140)	Variable	This control is located next to the PIP OUTPUT terminals. It is used to adjust the amplitude of the crystal-positioned markers over a range of zero to 5 volts peak.
VAR LEVEL (R-100)	Variable	This control is used to vary the amplitude of the variable marker.
SWEEP WIDTH (R-20)	Variable	This control is used to adjust the width of the swept signal. Sweep width is continuously variable to a maximum of at least 30 mc above 50 mc or, at lower frequencies, 60% of the center frequency (70 mc at 130 mc sweep, MODEL RADAR 865AW). It is at its maximum when the control is set completely clockwise.
CRYSTAL MARKERS Switches (S-6 thru S-12)	Switchable	MODEL RADAR (865-A) & MODEL IF (866-A). Each of these toggle switches controls one of the eleven crystal-positioned markers. The markers may be used either individually or collectively. Normally, they are fed directly from the PIP OUTPUT terminals to the Y-axis input terminals on the CRO and are thus independant of the circuit under test.

CONTROL	POSITION	FUNCTION
		MODEL RADAR. (Cat. 865AW) The individual toggle switches are replaced by a rotary switch (S-19) which selects the crystal markers in varying groups.
SWEEPING OSCILLATOR Band Selector (S-1)	Variable	This is a six-position, rotary drum switch used to select the proper band for the desired operating frequency. Tuning for the three lower bands is shown on the dial immediately above this control. Tuning for the three upper bands is shown on the dial below this control.
VARIABLE MARKER Band Selector (S-2)	Variable	This is also a six-position, rotary drum switch used to select the proper cw range for the desired marker frequency.
Frequency Control, Sweeping Oscillator (C-12)	Variable	This is the center concentric knob of the sweeping oscillator band selector. This control is used to set center frequency of the sweeping output to any desired point within each band.
Frequency Control, Variable Marker (C-29)	Variable	This is the center concentric knob of the variable marker band selector. The variable marker may be positioned to any desired point on the sweep by adjusting this control.
Amplitude Controls, Sweep Oscillator Output (R-74, S-3 thru S-5).	Additive	These four controls, a variable attenuator (marked INCREASE) and three switched attenuators (20 DB, 10 DB and 3 DB) are used to control the amplitude of the signal appearing at the adjacent SWEEP OSC. OUTPUT jack J-2. These precise, switchable attenuators are additive and may be used either individually or collectively. The variable attenuator provides an additional 6 db of amplitude control.

CONTROL	POSITION	FUNCTION
POWER ON-OFF (S-17)	ON	This control is used to apply or remove a-c power from the instrument. When in the ON position, dial lites are lit, indicating that all filament circuits are energized and B+ applied to the sweep generator (V-2), and the agc amplifiers (V-8, V-9).
	OFF	All power is removed from the instrument.
ON-STANDBY (S-18)	STANDBY	In STANDBY position B+ is removed from all stages except the sweep generator (V-2) and the agc amplifiers (V-8, V-9).
	ON	When the STANDBY switch is set to ON position B+ is applied to all portions of the circuitry and the instrument is ready for operation.
LIN ADJ, Internal (R-29)	Variable	This control is located on the left side of the chassis. Proper adjustment is achieved when the rate of frequency change is linear across the entire sweep width.
PIP ADJ. (R-137)	Variable	This control is located on the right side of the chassis, just behind the front panel. This control is used to establish the sensitivity of the pip generator V-14. R-137 is properly adjusted when the range of the front panel control is maximized.
SYNC LOCK (R-9)	Variable	This control is located on the rear center of the chassis. The SYNC LOCK control is used to adjust the grid bias for section B of V-1. Its range of control permits the sync generator output to be locked to line frequency.

3-2 IDENTIFICATION OF TERMINALS.

TERMINAL	FUNCTION
SWEEP OUT Jack (J-1)	The sawtooth sweep voltage is available at these universal-type binding posts. Normally, the sweep output is connected directly to the X-axis input terminals on the CRO to provide scope sweep synchronized with the swept rf from J-2.
SWEEP OSC OUTPUT Terminal (J-2)	This is a BNC-type terminal from which the sweeping rf is available.
PIP OUTPUT Terminal (J-3)	MODEL RADAR, Cat. 865-A and MODEL IF, Cat. 866-A When one or more of the marker switches are set to the on position, the respective crystal-positioned, pulse-type frequency markers are made available. MODEL RADAR, Cat. 865AW In this version of the MODEL RADAR, the crystal-positioned markers are selected in groups by a rotary switch and made available at these terminals. (For all models the variable marker also appears at this terminal).
DET INPUT Terminal (J-5)	This terminal is available on the MODEL RADAR, Cat. 865AW only. The detected output of the circuit under test is fed to this terminal and thence to the input of the cathode-follower-mixer V-15.
SCOPE Terminal (J-4)	(Available on 865AW only). After the internal mixing of the pips with the detected input, the signal is brought out to this connector.

3-3 OPERATING PROCEDURE.

1. Interconnect the equipment as described in Section II, and as illustrated in Fig. 2-1 or Fig. 2-3.

2. Set ON-OFF power switch to ON position. Allow several minutes warm-up time.

3. Set STANDBY switch to ON position. Allow another few minutes for the equipment to stabilize.

4. Adjust scope controls until usable response curve is obtained on the scope screen.

5. Adjust REP RATE control until stationary pattern is obtained.

6. Set SWEEPING OSCILLATOR and frequency control to desired center frequency.

7. Adjust SWEEP WIDTH control to obtain desired sweep width about center-frequency.

8. Set INCREASE control of sweep oscillator output and switchable attenuators to obtain desired amplitude of sweeping signal.

9. If crystal-controlled markers are required, set appropriate CRYSTAL MARKERS switch(es) to ON position.

10. If a variable marker is required, it is obtainable at the PIP OUTPUT connector (J-3), and its amplitude is increased or decreased by the VARIABLE LEVEL marker control.

11. Rotate the PIP ADJUST control until a full complement of stable markers appear on the screen.

12. Adjust INCREASE PIP LEVEL control until markers are of desired height.

SECTION IV
CIRCUIT DESCRIPTION

4-1 INTRODUCTION.

Operation of the VARI-SWEEP can be more readily comprehended by referring to Fig. 2-2, the functional block diagram, and the schematics at the rear of the manual. In addition to a regulated power supply, the basic circuits of the VARI-SWEEP include:

1. Sawtooth Sweep Circuits.
2. Sweeping Oscillator Circuits.
3. AGC Circuits.
4. CW Oscillator Circuits.
5. Marker Circuits.

4-1A SAWTOOTH GENERATOR CIRCUITS.

These circuits generate a regular sawtooth voltage which is normally locked to the 60-cps power-line frequency. For hum measurements and other special tests, this rate may be varied around this frequency by adjusting R-11, the REP RATE control. The sawtooth signal is used both as a horizontal deflection signal for the CRO and to drive the sweeping oscillators through their respective ranges.

a. Sync Generator (V-1). This stage uses a 5963 dual-triode in a Schmitt trigger circuit to generate a negative synchronizing pulse for the sweep generator stage. A small portion of the 60-cps filament voltage is fed directly to the grid of V-1. The repetition rate of the sync generator is controlled by this signal. The setting of the internal sync lock pot R-9 controls the firing point of the sync generator.

b. Sweep Generator (V-2). This square-wave generator is essentially a free-running multivibrator, with repetition rate determined both by the setting of the REP RATE control (R-11) and the trigger frequency of V-1. To provide a clear, zero-voltage reference baseline, the square-wave output is fed to the grid of the sweeping oscillators (V-4, V-5), thereby disabling the oscillator during the negative portion of the square-wave generator output. The square wave is also fed to an integrating network which shapes it to a regular sawtooth. This voltage is then fed to the sawtooth amplifier (V-3) and the SWEEP OUTPUT terminals, where it is used as a horizontal deflection signal for the CRO.

4-1B SAWTOOTH AMPLIFIER (V-3).

Plate potential for the sawtooth amplifier (V-3) is supplied through the series-connected control winding (L-1) of the sweep yoke. Current flow through V-3 will vary with the sawtooth voltage on its grid. The resultant varying current flowing through L-1 varies the inductance of the sweeping oscillator tank coils L-2, L-3, etc., and the frequency of the oscillator. The sawtooth amplifier would function as a regular pentode amplifier except for diodes D-1, D-2, D-3 in its cathode circuit. The diodes purposefully produce nonlinear gain in V-3 as it drives the sweep yoke L-1 through each sweep cycle. The nonlinear gain characteristic of V-3 counteracts the nonlinear magnetic properties of the ferrites used in the sweep yoke secondaries. This counteraction enables the oscillators to produce linear frequency sweeps on all bands. Before further consideration is given to the diodes, operation of the sweep yoke should be explained.

The sweep yoke is an electromagnetic control device which frequency modulates the sweeping oscillator (V-4, V-5) by changing the inductance of the tank coils L-2, L-3, etc. The yoke consists of a control winding wound on a C-shaped, laminated iron core. The C-shaped core straddles or 'yokes' the turret holding the oscillator tank coils, which are wound on ferrite rods. The mechanical arrangement of yoke and turret is such that at each band position, a ferrite rod is positioned in the open side of the yoke and completes its magnetic circuit.

Current through the control winding of the yoke produces a magnetic field in the core and the ferrite rod. The magnetic field through the ferrite reduces its permeability and therefore, the inductance of the coil wound on it (inductance being a direct function of the permeability). Reducing the tank coil inductance raises the r-f oscillator frequency. Current through the control winding is the plate current of V-3, the sawtooth amplifier. This current is 'swung' by the sawtooth voltage applied to the grid of V-3 to sweep the r-f oscillator.

The nonlinear saturation characteristics of the ferrites would cause nonlinear frequency deviation of the r-f oscillator if the control winding of the sweep yoke were driven by a linear sawtooth signal. Diodes D-1, D-2 and D-3 in the cathode circuit of V-3 distort the sawtooth current flowing in V-3 and the sweep yoke control winding, effectively 'straightening out' the nonlinearity of the ferrite's saturation characteristics. The diodes act as switches which close at appropriate times during the sweep cycle. As each diode switch closes, it reduces the resistance in the cathode of V-3 and increases the current through it.

4-1C SWEEPING OSCILLATOR CIRCUIT (V-4, V-5).

Two type 5718 sub-miniature triodes V-4, V-5 are used in a grounded cathode, balanced push-pull oscillator circuit, to generate frequency sweeps with center frequencies selectable and variable. Center frequency for each band setting is determined by the inductance of the sweep yoke secondary switched in the circuit and the capacity of C-12A and B. The repetition rate of the frequency sweeps is that of the sweep generator V-2. As the current through the sweep yoke L-1 varies with the sawtooth voltage applied to the grid of V-3, the inductance of the oscillator tank coil in the circuit varies. Thus, the oscillator undergoes a change in

frequency, over the limits set by the sweep width control R-20. The oscillators are blanked during the flyback period of the sawtooth voltage by the application of a negative blanking voltage to their grids. Oscillator output is coupled out through pick-off loops L-2B, L-3B, etc. Agc'd plate potential keeps the output constant from band to band.

4-ID AUTOMATIC GAIN CONTROL CIRCUITS.

The agc circuits incorporate a voltage-doubler detector, first and second agc amplifiers, and a cathode-follower output tube. These circuits are individually discussed.

A. Agc Detector (diodes D-5 and D-6.

Two high-frequency diodes are used in a voltage-doubler detector circuit to sample the r-f output and provide an error voltage to the agc amplifiers. The detected output is d-c coupled to the grid of the first agc amplifier V-8.

B. First Agc Amplifier (V-8).

This tube amplifies the error voltage from the agc detector and also incorporates in its grid circuit the RF LEVEL control R-74A. The effective voltage on the grid of V-8 is the sum of the negative voltage derived from the detector and the positive voltage derived from the RF LEVEL control, plus its associated resistive network R-73 and R-75. The setting of the RF LEVEL control will determine the average grid bias for V-8 and eventually, the average plate voltage for the type 5718 tubes in the sweeping oscillator V-4, V-5.

C. Second Agc Amplifier (V-9).

This tube has its grid directly coupled to the plate of the 1st agc amplifier and further amplifies the error voltage.

D. Agc Cathode-Follower Output (V-10).

A type 6BK7A is used as a cathode-follower output tube. The cathodes of V-10 supply plate voltage directly to the r-f oscillator tubes through the center-tapped plate tank coils.

The error voltage applied to V-8 appears on the grids of V-10 greatly amplified; the cathodes of V-10 and therefore, the plates of the r-f oscillator tubes follow the error voltage and maintain the r-f output constant. Variable capacitor C-23 provides adjustment of the negative feedback from the cathode-follower output to the grid of the 2nd agc amplifier. The negative feedback stabilizes the amplifier and prevents it from oscillating or ringing.

4-1E VARIABLE MARKER CIRCUITS.

The variable marker is generated by a separate c-w oscillator (V-6, V-15 in MODELS RADAR & IF; V-6, V-16 in MODEL RADAR 865AW). The output is mixed with the sweep oscillator signal, detected, shaped, and then fed to an audio amplifier (the variable marker amplifier, V-7) and subsequently to the PIP OUTPUT terminals (J-3).

a. CW Oscillator. Two type 5718 triodes are used in a tuned-plate, push-pull c-w oscillator. Oscillator frequency is determined by the setting of the band selector (S-2) and by frequency control capacitor C-29. The output of this stage is then fed to the variable marker detector (D-4).

b. Variable Marker Detector. A high-frequency diode (D-4) is used in a simple detector arrangement. This circuit detects the beat frequency which is the result of mixing the c-w and the sweep. Its output is fed to a shaping network and then to the grid of the variable marker amplifier (V-7). This circuit uses a 12AT7 as an audio amplifier and amplifies the shaped detected resultant of the sweep and the c-w output. Amplifier output is then fed to the PIP OUTPUT connector (J-3).

4-1F CRYSTAL MARKER CIRCUITS.

These circuits are used to generate the pulse-type, crystal-positioned markers which are accurate to ±0.05%. These circuits include a series of tuned absorption-type crystal filters (which form the fixed markers), two pulse amplifiers, and a pip generator.

a. Crystal Marker Circuits (Y-1, Y-2, etc.). These crystals are used in absorption-type marker circuits to produce the crystal-positioned markers. As the frequency of the sweeping oscillator passes a given crystal frequency, that crystal generates a train of oscillations which is rectified (D-8) and applied to the control grid of the first trigger amplifier (V-12).

b. First Trigger Amplifier (V-12). This stage employs a 12AU7 dual triode to provide two stages of amplification for the trigger voltage. A 50-K potentiometer (R-74B) ganged with the RF LEVEL control is used in the plate circuit to keep the marker output constant as the RF LEVEL control is varied. A PIP ADJUST control (R-125) is employed in the plate circuit to control the level of the triggering pips. This control is adjusted to supply pips of sufficient amplitude without causing spurious pulses. The amplified output is fed to the second trigger amplifier (V-13).

c. Second Trigger Amplifier (V-13). This stage employs a 12AU7 which provides an additional two stages of amplification for the marker trigger pulses before feeding them to the pip generator multivibrator (V-14).

d. Pip Generator (V-14). This stage is a one-shot multivibrator employing a 12AT7 dual triode. Positive trigger pulses from the second trigger amplifier are supplied to the grid of V-14. Each trigger pulse causes the multivibrator to produce one positive marker pulse. This pulse is fed to the PIP LEVEL control (R-140), then to the PIP OUTPUT terminal J-3.

Up to 11 frequency markers may be incorporated in the VARI-SWEEP MODELS RADAR and IF; this limit is established by space considerations for the individual toggle switches for each marker.

In the VARI-SWEEP MODEL RADAR, Catalog 865AW, a rotary switch (S-19) is used to switch the crystals, individually or in groups, thus providing a more flexible use of markers. In this version of the VARI-SWEEP, the number of frequency markers may exceed the limit established for MODELS RADAR and IF.

4-1G REGULATED POWER SUPPLY CIRCUITS, MODEL 200ASM-2.

The voltage regulator circuits compensate for power-line voltage fluctuations or power-supply load changes. The regulator circuits sense these changes and respond electronically to maintain the output voltage constant.

Operation of the regulator circuit can be analyzed by considering a power-line fluctuation presenting a voltage rise at the primary of T-1. This voltage rise will cause the power supply output voltage (the B+ voltage) to rise. This increase of B+ voltage increases the current through V-7, thus raising the grid bias of V-5, permitting it to conduct more current and causing a corresponding drop in its plate voltage.

Since the plate of V-5 is tied directly to the grids of V-4, these are driven less positive, reducing the current flow through the tube and causing a drop in cathode potential across R-12, which lowers the voltage at the grids of V-1, V-2 and V-3. When the grids of V-1, V-2, V-3 are made less positive, current through these tubes is decreased, causing a decrease in potential at their cathodes which furnish the regulated 250 volts B+ voltage. Thus, the increase of line voltage is compensated by an opposite voltage developed in the regulator circuit, keeping the output voltage constant.

The type 5651 regulator tube (V-7) feeds back slow transients and long-term line voltage fluctuations to the grid of V-5. Voltage changes of short duration (sharp transients) are compensated by capacitor C-3. Regulator tube V-6 clamps the cathode of V-5 at 105 volts thereby establishing the 105V B+ output, since V-6 will discharge any potential above 105 volts.

Conversely, a power-line fluctuation presenting a lower voltage to the primary of T-1, will cause the regulating circuit to act in reverse of that for a higher voltage, as dealt with before. The regulating circuits also remove any residual ripple from the filter output. Regulator tube V-7 and capacitor C-3, see ripple as voltage changes and respond, as previously related, by presenting an opposite compensating voltage to maintain the output smooth and of constant amplitude. Changes of power-supply load are also reflected back to the regulator circuit and dealt with in similar fashion. Output capacitor C-4A, B is of sufficient capacity to retain a steady charge and further stabilize the output voltage.

Capacitor C-5 across the 250 volts B+ output is a high-frequency filter for the B+ line. Voltage regulation control R-16 is adjusted for 250 volts B+ output, as measured between chassis-ground and pin #6 of J-2.

SECTION V
MAINTENANCE

5-1 INTRODUCTION.

This section covers recommended procedures to locate circuit malfunction, alignment and adjustment instructions, voltage and resistance measurements, and other service topics.

A routine check of electron tube performance and possible re-adjustment of internal controls, to insure accurate calibration of the circuits, should suffice to keep the VARI-SWEEP in good operating condition. The frequency of such checks will depend on environmental conditions and length of usage. If operation of the VARI-SWEEP appears defective in any respect, first ascertain that the cause is not in the associated equipment, or in the interconnections between equipment. The most common cause of malfunction is due to weak or defective electron tubes, or diode failure. Trouble-shooting procedure will include testing the tubes for short circuit, open circuit, intermittent condition, microphonics, gassyness, or other signs of defectiveness.

5-2 TROUBLE-SHOOTING SUGGESTIONS.

Trouble-shooting consists mainly of a process of elimination. The operator will seek to isolate the circuit and then the specific component(s) causing the malfunction. To do this, voltage and resistance measurements can be compared with those furnished in Tables 5-4 through 5-7. The use of an oscilloscope for signal tracing is recommended. Precautions should be taken to avoid loading-down the circuit being tested when taking voltage measurements, especially around the input grid circuits, and in the oscillator circuits. A vtvm is necessary to check bias voltages, and then, an isolating resistor in series with the probe is sometimes necessary. When signal tracing in the r-f carrying sections of the circuitry, the use of a detector-probe is necessary.

Further assistance in trouble-shooting the equipment is furnished in the following listing of symptoms and possible causes.

TABLE 5-1, TROUBLE LOCATION CHART, RF CIRCUITS

SYMPTOM	POSSIBLE CAUSE
Loss of horizontal deflection on scope.	Check Sweep-Generator tube V-2 and its immediate circuitry. When the sweep-generator stage is inoperative, horizontal deflection voltage for the scope is lost and Sweep Oscillator tubes V-4, V-5 are no longer frequency modulated.

SYMPTOM	POSSIBLE CAUSE
Loss of Sweep Width control.	Check Sawtooth Amplifier V-3. If Sweep-Generator V-2 and Sweeping Oscillators V-4, V-5 are functioning, a response trace and baseline will be seen on the scope.
Poor sweep linearity.	Check diodes D-1, D-2, D-3 and V-3. LINEARITY ADJ pot R-29 determines conduction point for diode D-2. If adjustment of this control fails to correct non-linearity, check the diodes and try another 6V6 in V-3 position (see Section 4-1B for explanation of diodes function).
No r-f output at J-2.	Check V-4, V-5 and agc circuit. An inoperative agc output tube (V-10) will result in loss of plate potential at the 5718 oscillator tubes and loss of vertical deflection on scope.
No baseline.	Check C-17 and D-10. Loss of blanking pulses at grids of V-4, V-5 could be caused by open C-17 or shorted D-10.
No markers.	Check Trigger Amplifiers V-12, V-13 and Pip Generator V-14. Check diodes D-7, D-8.
Lack of RF LEVEL control.	Check V-8, V-9. A defective 6AU6 in V-8 position will result in reduced vertical amplitude (as seen on scope) and loss of RF LEVEL control. An increase in vertical amplitude accompanied by ineffective RF LEVEL control action indicates a defective 6AU6 in V-9 position, or trouble in associated circuitry.
Loss of variable marker, fixed marker ok.	Check V-6, V-15 and associated circuitry. Check V-7 and D-4 (in Model 865AW, check V-6, V-16, V-7 and D-4).
General instability of scope trace, possibly accompanied by hum or ripple.	Check power supply section. Measure regulated B+ and readjust to 250 volts, if necessary. Check tubes and components in power supply.

5-3 ALIGNMENT AND ADJUSTMENT.

Normal aging of components and tubes, plus prolonged operation of the instrument, may effect performance. Should it become necessary to realign the circuitry, it is recommended the following sequential procedure be adhered to. The accuracy of the alignment will depend on the accuracy of signal sources used, and precision of adjustments made during the alignment and adjustment procedure.

Test Equipment Required:

(a) External Detector. (See Fig. 5-1 for recommended circuit and construction details).

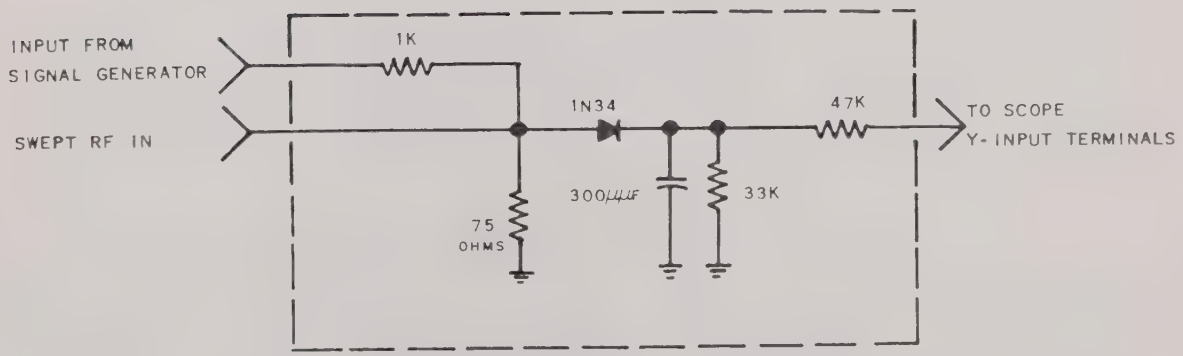
(b) Oscilloscope.

(c) VTVM.

(d) CW Generator having a frequency range somewhat greater than the Vari-Sweep.

(e) Interconnecting Cables.

Before making any alignment adjustments, allow the VARI-SWEEP a 15-minute warm-up period, and then check the B+ voltage at pin 6 of J-1. B+ potential at this point should be 250 volts; readjust R-16 to obtain this voltage, if necessary.



CONSTRUCTION: ALL COMPONENTS SHOULD BE MOUNTED IN METAL SHIELD AND COMPONENTS PHYSICALLY ISOLATED FROM METAL SIDES TO KEEP STRAY CAPACITANCES LOW. INPUT AND OUTPUT TERMINALS TO BE COMPATIBLE WITH TERMINATIONS ON INTERCONNECTING CABLES. (75 OHM RESISTOR SHOULD BE 50 OHMS FOR UNITS HAVING 50 OHM IMPEDANCE ATTENUATORS.)

Fig. 5-1, EXTERNAL DETECTOR-MIXER CIRCUIT.

Before proceeding with the alignment and check-out outlined in Sections 5-3A thru 5-3F, it is advisable to check the Sweep Oscillator dial calibrations against the Variable Marker for each band. To do this, provide a connection between the SWEEP OUT terminal (J-1) and the X-axis input terminal on the CRO; provide coaxial connections between the SWEEP OSC OUTPUT terminal (J-2) to one input terminal on the external detector (Fig. 5-1) and another between the PIP OUTPUT terminal (J-3) and the second input terminal on the detector. Now, provide a coaxial connection between the detector output and the Y-axis input terminals on the CRO.

Turn the SWEEP WIDTH control fully counterclockwise for minimum sweep width. With both dials set at the same frequency a bird should appear. Sweep oscillator coils may be adjusted slightly to correct for small inaccuracies of sweep oscillator dial calibration. Spreading the coil turns lowers the inductance and raises the frequency.

Accuracy of the variable marker may be checked by comparing the variable marker with the crystal-positioned markers. (See Section 5-3E).

5-3A ALIGNMENT OF SAWTOOTH SWEEP CIRCUITS.

Since the sweep generating circuits (V-1, V-2, V-3) develop the initiating voltages for action in the remainder of the circuitry, a check-out of these circuits will be made first. To accomplish this proceed as follows:

a. Provide a connection between the SWEEP OUTPUT terminal (J-1) and the Y-axis input terminal on the CRO. Adjust the scope X-axis controls for an approximate 60-cps sweep; sync control set for 60-cycle lock.

b. Adjust the REP RATE control (R-11) to set the sweep rate to approximately line frequency.

c. Adjust the SYNC LOCK control (R-9), (mounted on the rear of the chassis) to lock the sweep generator to the line frequency.

d. The sweep output at J-1 should be a triangular wave of at least 7.0 volts peak-to-peak. Sync should hold over at least 30-degree rotation of the REP RATE control.

5-3B CHECK-OUT OF SWEEP WIDTH, CENTERING AND LINEARITY.

Potentiometer R-29 provides a means of adjusting linearity of the swept frequency. Since the gain of this stage may vary with individual type 6V6 tubes, sweep linearity should be checked if this tube is changed.

Sweep centering is established by factory-selected resistors R-43 through R-48, the setting of the tuning capacitor C-12 and by the inductance of the oscillator tank coil (L-2A, L-3A, etc.) switched into the circuit by SWEEPING OSCILLATOR selector switch S-1.

Sweep width is established by factory-selected resistors R-37 through R-42 and the setting of SWEEP WIDTH control R-20.

PROCEDURE:

1. Center Frequency Adjustment.

If center frequency for any one of the six switched bands requires adjustment, the frequency can be raised or lowered, by spreading or compressing the coil turns of L-2A, L-3A, etc. Spreading the turns will reduce the inductance (raise the frequency), or conversely, compressing the turns will increase the inductance and lower the frequency. If this adjustment is undertaken, caution should be exercised to avoid damage to the coil turns and the ferrite rods.

2. Sweep Width Adjustment.

If the variable marker section of the VARI-SWEEP is functioning properly, this signal source may be used to check sweep width. However, if the accuracy of this section is doubtful, an external c-w generator may be used.

PROCEDURE (Using internally generated variable marker):

a. Provide a connection between the SWEEP OUT terminal (J-1) and the X-axis input terminal on the CRO. (The CRO X-axis controls are set for X-amplifier input, scope sweep inoperative).

b. Provide another connection between the PIP OUTPUT terminal (J-2) and the Y-axis input terminal on the CRO.

c. Set the VARIABLE MARKER selector switch (S-2) to the appropriate band position and the SWEEP WIDTH control (R-20) to maximum, fully clockwise, and the Sweeping Oscillator dial set to the lowest specified center frequency for the band in use.

d. Now, move the variable marker to the left edge of the sweep by adjusting the center concentric knob of the VARIABLE MARKER selector switch, and record this frequency. Move the marker to the right edge and record this frequency. Subtracting the lower frequency from the higher will give the sweep width in megacycles. Decreasing the value of the sweep width resistor (R-37, R-38, etc.) increases the sweep width.

Method Using An External CW Source:

a. Make connection as in step 2a.

b. Provide coaxial connections between the SWEEP OSC OUTPUT terminal (J-2) and the input to the external detector (Fig. 5-1), and between the external cw source and the detector input. Connect the detector output terminal to the Y-axis input on the CRO. These interconnections permit the mixing of the sweeping signal from the VARI-SWEEP with the c-w signal from the external c-w generator within the detector circuit shown in Fig. 5-1.

c. Tune the generator to the lowest specified center frequency of the the band being checked and turn the SWP WIDTH control (R-20) to maximum (fully clockwise). The center-frequency beat should appear at the center of the trace. Now measure sweep width by tuning the signal source until the beat appears at the extreme left of the sweep display. Record this frequency. Then tune the source until the beat is at the extreme right of the sweep. Record this frequency. Subtract the lower frequency from the higher. The result is the sweep width in megacycles, and should be sufficiently wide to meet specifications, as previously referenced.

For example: If center frequency for the band being checked is 60 mc, sweep width should be at least 30 mc. Therefore, 60 mc should appear at the center of the sweep, 45 mc at the left, and 75 mc at the right. If sweep width is less than 30 mc, decrease the value of the sweep width resistor until a little more than 30 mc is obtained. (Example pertains to VARI-SWEEP MODEL IF).

When sweep width is correct, sweep centering should be rechecked. This can be accomplished by -

a. Set the output frequency to center of band being checked.

b. Turn SWEEP WIDTH control fully counterclockwise (min. sweep width).

c. Position variable marker in center of pattern.

d. Now turn SWEEP WIDTH fully clockwise (max. sweep width).

Variable marker should stay within 10% of pattern center. If it does not, select a new value centering resistor (R-43, R-44, etc.) to center the marker. Increasing the value of the centering resistor moves the beat to the left. Centering resistor value may effect the sweep width and a recheck of sweep width should be made after centering is accomplished. This procedure should be repeated for all band positions. If difficulty is encountered in obtaining proper sweep width on all bands, it may be due to insufficient sweep voltage; in which case, selection of a new 6V6 tube for V-3 position may provide the required output.

5-3C ADJUSTMENT OF SWEEP OSCILLATOR AND AGC OUTPUT.

The agc circuit furnishes plate potential for the sweeping oscillators V-4, V-5, to keep the oscillator output constant across each sweep and from band to band. Oscillator output is approximately 1 volt rms maximum. A sample of this voltage is fed to the agc input tube V-8. Since the agc circuit requires about 1 volt rms input to function properly, it can be seen oscillator output must be adjusted to fulfill this requirement.

If the pick-off loops L-2B, L-3B, etc., are coupled too tightly, the oscillator may be loaded-down preventing oscillation. If the loops are coupled too loosely, the output may be inadequate for proper operation of the agc. Small adjustments of the agc can be accomplished by spreading or compressing the turns on the pick-off loops. This method and a more comprehensive treatment follows.

PROCEDURE:

An r-f signal-generator capable of at least 1 volt metered output is required. Calibrate the scope for a convenient 1 volt reference by setting its Y-axis amplifier for d-c operation, and the signal generator output for 1 volt. Then feed the signal generator output into the scope Y-axis through the detector (Fig. 5-1) and adjust the Y-gain control and scope Y-attenuator for vertical references. Now connect the RF OUTPUT from the VARI-SWEEP, through the detector, to the Y-input terminals on the scope. Set the RF LEVEL control R-74 to maximum (fully clockwise) with no attenuation (S-3 thru S-5 in OFF position). The agc should be holding the r-f output flat at 1 volt or slightly higher.

The output level may also be measured directly with a suitable voltmeter. If, a voltmeter is used to measure the output, the the junction of R-26 and C-66 should be grounded to remove the blanking signal from the r-f oscillators

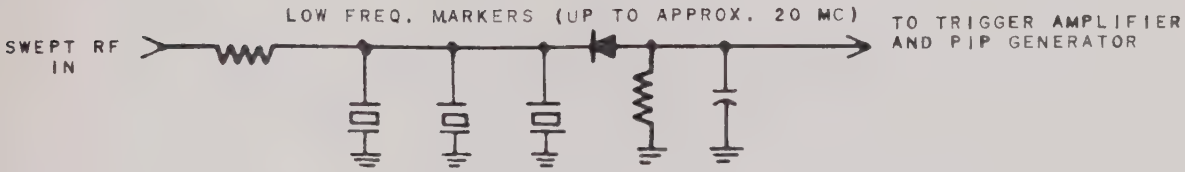
If the r-f output is flat across the entire sweep width but is less than 1 volt in amplitude, the grid bias on the agc input stage V-8 should be adjusted to increase the r-f output. Decreasing the value of R-73 raises the output. If the r-f level is not flat but is more than 1 volt, or if the output is flat over part of the sweep and is more than 1 volt; R-73 should be increased until the r-f level is reduced to 1 volt and the agc holds across the entire sweep width. If the output is less than 1 volt and the agc is not holding, the pickoff loop (L-2B, L-3B, L-4B, etc.) for that band should be adjusted (the turns spread or compressed) to increase the output to a level where the agc holds. If the agc circuit is overloaded (the output flat, but unresponsive to the RF LEVEL control, or if the agc circuit looses control of the output as the output is reduced with the RF LEVEL control) then a resistor of a value between 2.7K and 12K, just sufficient to prevent the overloading, should be soldered directly across the oscillator tank coil (L-2A, L-3A, L-4A) for that band.

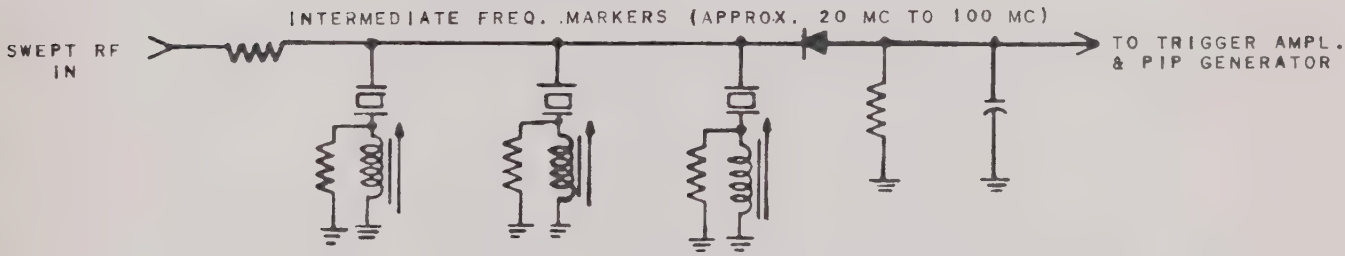
The RF LEVEL control should provide approximately 6 db variation in the r-f output. If the variation is less than 6 db, decrease R-75; if the variation is more than 6 db, increase R-75. Changing R-75 changes the r-f output level. R-73, therefore, may now have to be readjusted.

Trimmer capacitor C-23 furnishes negative feedback to the 2nd agc amplifier and adjustment of this control may be used to minimize the spike appearing at the beginning of the sweep.

5-3D CRYSTAL CIRCUIT ADJUSTMENT.

All crystals in the crystal marker circuits are specifically cut to the customer's order. Trimmer capacitors, inductors, resistors, etc., in this circuit are also selected at the plant to furnish frequency markers for each band at specified frequencies, therefore, values have not been assigned to all components in this circuit. It should also be pointed out that these circuits (as shown on the schematics) illustrate the basic concept only and may be modified by insertion of inductors, additional capacitors, resistors, etc., to produce frequency markers as specified by the customer. Fig. 5-2.





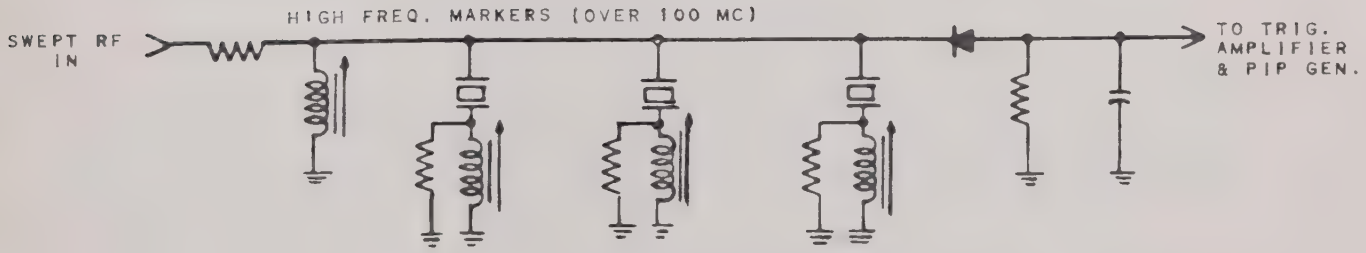


Fig. 5-2, TYPICAL CRYSTAL MARKER CIRCUITS.

The amplitude of the swept rf presented to the marker crystals depends on sweeping oscillator frequency, degree of coupling provided by pick-off loops (L-2B, L-3B, etc.). To provide a swept r-f signal of proper amplitude to the marker crystals, resistors R-49, R-50, etc., are selected for optimum value. Reducing the value of these resistors increases the amplitude of the swept rf at the crystals.

PROCEDURE:

a. Provide a connection between the junction of D-9 and R-130, and the Y-axis input terminals on the CRO. (Remove V-14 from the socket to prevent pips generated here from appearing on the scope screen).

b. Set the pip amplitude with the PIP ADJ control (R-125) to a level where none of the pips are overloading the amplifier, i.e., the level at which all pips vary equally as the PIP ADJ control is varied.

c. Tune the inductors in the marker circuit being checked (L-16, L-17, etc.) for maximum marker amplitude.

d. Equalize the amplitude of the markers by adjusting the value of resistors shunting L-16, L-17, etc. Increasing the resistor value increases marker amplitude.

e. Repeat the procedure for each band setting, or as required. Replace V-14.

Internal PIP ADJ control R-137 controls the conduction point for V-14 and is adjusted to produce a full complement of marker pips for each band position when the external PIP ADJ control (R-125) is varied. The CRO is connected to J-3 for this observation. Proper overall adjustment will produce one marker pip for each marker crystal switched into the circuit, without the presence of multiple or spurious marks appearing.

5-3E CHECK-OUT OF VARIABLE MARKER CIRCUITS.

Output from the c-w generator is mixed in diode D-4 with the swept rf from the sweeping oscillator (V-4, V-5). The resultant audio signal is applied to section B grid of V-7, the variable marker amplifier. This signal is further amplified in section A of V-7 (which incorporates the VAR LEVEL ADJ control R-100) and then coupled to the PIP OUTPUT jack J-3.

Variable oscillator frequency is determined by the plate shunt capacity, established by the setting of C-29A, B and by the inductance of the plate tank coil (L-9A, L-10A, etc.) placed in the circuit by the VARIABLE MARKER OSCILLATOR switch S-2.

Accuracy of the variable marker may be checked by comparing it with the crystal-positioned markers. Small adjustments in oscillator frequency may be accomplished by compressing or expanding the coil turns of the respective tank coils (L-9A, L-10A, etc.). Maximum accuracy occures when the birdie coincides with the crystal marker.

5-3F CHECK-OUT OF POWER SUPPLY SECTION.

a. Voltage Adjustment. The setting of R-16 determines the d-c voltage output of the power supply. To adjust R-16, connect a d-c voltmeter between pin 6 of J-1 and chassis ground; (with all power on and power supply under full load) set R-16 to furnish 250 volts input for the VARI-SWEEP.

b. Trouble Location. Table 5-3 will aid in locating troubles in the power supply.

TABLE 5-3, TROUBLE LOCATION CHART, POWER SUPPLY SECTION

SYMPTOM	PROBABLE CAUSE AND CORRECTION
Zero output voltage from power supply; no heaters light.	Check fuse; if blown, check C-1 and C-2 for short before replacing. Also check D-1 thru D-4 for short. Check a-c wiring; check T-1 and T-2.
Zero output voltage, all tubes light.	Check D-1 thru D-4. Check C-2, C-3, C-4A and C-4B for shorts. Check for open HV winding on T-1; check associated equipment for B+ short.
Low output voltage; poorly regulated.	Check tubes, check C-4 and C-5 for shorts. Check R-15, R-16.
Voltage output higher than normal. Poor regulation.	Check V-7. Open R-15, R-16. Check tubes V-4, V-5 and V-6.
Excessive ripple in d-c output.	Check C-1 and C-2. Check for excessive load on supply.

TABLE 5-4, RESISTANCE MEASUREMENTS, RF CIRCUITS

NO.	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V-1	5963	24 K	500 K	10 K	GROUND	GROUND	20 K	500 K	10 K	
V-2	6J6	120 K	120 K	GROUND	---	3.6 M	3.6 M	GROUND		
V-3	6V6	GROUND	---	18 K	30 K	500 K	---	GROUND	900	
V-4	5718	9 K	---	---	---	GROUND	GROUND	---	---	
V-5	5718	9 K	---	---	---	GROUND	GROUND	---	---	
V-6	5718	45 K	---	---	---	GROUND	GROUND	---	2 K	
V-7	12AT7	120 K	110 K	1 K	GROUND	GROUND	120 K	100 K	1 K	---
V-8	6AU6	1.2 M	GROUND	GROUND	---	3.6 M	14 K	GROUND		
V-9	6AU6	3.6 M	12 K	GROUND	---	*470 K	40 K	12 K		
V-10	6BK7	*27	*470 K	---	---	GROUND	*27	*470 K		
V-11	OA2	---	GROUND		GROUND	---		GROUND		
V-12	12AU7	120 K	120 K	470	GROUND	GROUND	120 K	110 K	470	---
V-13	12AU7	120 K	250	470	GROUND	GROUND	120 K	100 K	470	---
V-14	12AT7	220 K	110 K	GROUND	GROUND	GROUND	55 K	220 K	15 K	---
V-15	5718	45 K	---	GROUND	---	GROUND	---	---	2 K	

RESISTANCE MEASUREMENTS TAKEN WITH POWER SUPPLY DISCONNECTED.

THESE READINGS MAY VARY IF CAPACITORS ARE NOT FULLY DISCHARGED.

*READINGS WITH ASTERISK WERE TAKEN WITH CAPACITOR C-11B (20μF. ELECTROLYTIC) SHORTED OUT.

TABLE 5-5, VOLTAGE MEASUREMENTS, RF CIRCUITS

NO.	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V-1	5963	210 V	104	110	GROUND	GROUND	220	100	110	6.3VAC
V-2	6J6	120	135	GROUND	6.3VAC	-44	-30	GROUND		
V-3	6V6	GROUND	6.3VAC	225	155	10	---	GROUND	17	
V-4*	5718	-8	---	6.3VAC	---	GROUND	GROUND	---	114	
V-5*	5718	-8	---	6.3VAC	---	GROUND	GROUND	---	114	
V-6*	5718	-8	---	6.3VAC	---	GROUND	GROUND	---	160	
V-7	12AT7	102	0	1.3	GROUND	GROUND	106	0	1.3	6.3VAC
V-8	6AU6	-1.2	GROUND	GROUND	6.3VAC	36	9.5	GROUND		
V-9	6AU6	36	38	GROUND	6.3VAC	86	105	38		
V-10	6BK7	440	85	120	6.3VAC	GROUND	440	85	120	GROUND
V-11	OA2	120	GROUND	---	GROUND	120	---	GROUND		
V-12	12AU7	43	0	.9	GROUND	GROUND	43	0	1	6.3VAC
V-13	12AU7	43	0	.9	GROUND	GROUND	43	0	1	6.3VAC
V-14	12AT7	47	-3	GROUND	GROUND	GROUND	250	47	70	6.3VAC
V-15*	5718	-8	---	GROUND	---	GROUND	6.3VAC	---	160	
865AW only										
V-15	12AT7	102	2.5	6.2	GROUND	GROUND	102	4.3	6.2	6.3VAC
V-16	5718	-8	---	GROUND	---	GROUND	6.3VAC	---	160	---

VOLTAGE TAKEN WITH SWEEP OSC SWITCH (S-1) ON 4-7 MC RANGE; VARIABLE MARKER SWITCH (S-2) ON 2.5-5 MC RANGE; STANDBY SWITCH (S-18) ON. PIP ADJ CONTROL (R-125) AND PIP LEVEL CONTROL (R-140) FULLY COUNTERCLOCKWISE; SWEEP WIDTH CONTROL R-20 TURNED FULLY CLOCKWISE.

*VOLTAGE READINGS WERE TAKEN WITH A 100 K OHM RESISTOR IN SERIES WITH THE VTVM PROBE TO AVOID LOADING THE MEASURED CIRCUITS.

ALL VOLTAGE TAKEN WITH AN RCA VOLTOHMYST.

TABLE 5-6, RESISTANCE MEASUREMENTS FOR THE MODEL 200 ASM-2 POWER SUPPLY

NO.	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V-1	6AQ5	150 K	450 K	---	---	350 K	350 K	150 K		
V-2	6AQ5	150 K	450 K	---	---	350 K	350 K	---		
V-3	6AQ5	150 K	450 K	---	---	350 K	350 K	---		
V-4	12AU7	350 K	600 K	150 K	---	---	350 K	600 K	150 K	---
V-5	6AG5	60 K	350 K	---	---	600 K	350 K	350 K		
V-6	0B2	---	GROUND	---	GROUND	350 K	---	GROUND		
V-7	5651	---	---	---	---	350 K	---	100 K		

RESISTANCE TAKEN WITH POWER SUPPLY DISCONNECTED FROM INSTRUMENT.

THESE READINGS MAY VARY IF CAPACITORS ARE NOT FULLY DISCHARGED.

TABLE 5-7, VOLTAGE MEASUREMENTS FOR THE MODEL 200 ASM-2 POWER SUPPLY

NO.	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V-1	6AQ5	240	250	6.3VAC	6.3VAC	450	450	240		
V-2	6AQ5	240	250	6.3VAC	6.3VAC	450	450	---		
V-3	6AQ5	240	250	6.3VAC	6.3VAC	450	450	---		
V-4	12AU7	450	220	240	6.3VAC	6.3VAC	450	220	240	6.3VAC
V-5	6AG5	103	105	6.3VAC	6.3VAC	230	200	105		
V-6	0B2	---	GROUND	---	GROUND	105V	---	GROUND		
V-7	5651	---	---	---	---	250	---	160		

5-4 RESHIPMENT INSTRUCTIONS.

Permission to return equipment should in every case be obtained from the factory or an accredited Kay representative before return shipment is made.

If it becomes necessary to return the VARI-SWEEP to the factory for repairs, it should be wrapped in protective paper and then adequately padded with soft wadding to cushion the instrument during transit. The wrapped and padded unit should then be packed in a wooden box or suitable carton.

A packing slip should be included in the carton furnishing identification of the shipper. The packing slip should also reference the instrument type and serial number. A statement pertaining to the extent of malfunction should be included to acquaint service personnel with the purpose of returning the instrument.

SECTION VI
LISTING OF REPLACEABLE PARTS

6-1 INTRODUCTION.

This section contains listings of replaceable parts for both the VARI-SWEEP and Model 200 ASM-2 power supply. All resistors are ½ watt, 10% tolerance, composition type and all capacitor values are in μμf, unless otherwise indicated.

To maintain new-instrument performance when repairs are made, use only exact replacement parts, which are obtainable from Kay Electric Co. Reference the instrument type, serial number and circuit symbol number when ording replacement parts.

6-2 PARTS LIST, VARI-SWEEP MODEL IF.

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
	CAPACITORS: (ALL CAPACITANCES IN μμF. 500 VOLTS UNLESS OTHERWISE SPECIFIED.)	
C-1	0.01μF, CERAMIC DISC	6360-6
C-2	0.02μF, CERAMIC DISC	6360-7
C-3	25, CERAMIC (TUBULAR)	6361-11
C-4	20, CERAMIC (TUBULAR)	6361-9
C-5	2000, MICA	6359-34
C-6	2000, MICA	6359-34
C-7	0.01μF, CERAMIC DISC	6360-6
C-8	0.02μF, CERAMIC DISC	6360-7
C-9	0.25μF, 400V, PAPER	6353-6
C-10	91, SILVER MICA	6359-6
C-11 A & B	20/20 ELECTROLYTIC	6355-11
C-12 A & B	1-8, VARIABLE	5441
C-13	20, CERAMIC (TUBULAR)	6361-9
C-14	20, CERAMIC (TUBULAR)	6361-9
C-15	500, CERAMIC FEED THRU	6356-1
C-16	FACTORY SELECTED	
C-17	0.25μF, 400V, PAPER	6353-6
C-18	25μF, 25V, ELECTROLYTIC	6355-4
C-19	0.05μF, 400V (METALITE)	6354-2
C-20	0.01μF, CERAMIC DISC	6360-6
C-21	0.01μF, CERAMIC DISC	6360-6
C-22	FACTORY SELECTED	
C-23	4-30, CERAMIC TRIMMER	6358-6
C-24	500, CERAMIC FEED THRU	6356-1
C-25	300, SILVER MICA (MINIATURE)	6359-16
C-26	1000, CERAMIC (TUBULAR)	6361-25
C-27	6.8, CERAMIC (TUBULAR)	6361-31
C-28	6.8, CERAMIC (TUBULAR)	6361-31
C-29 A & B	3.8-45, VARIABLE	4959
C-30	0.01μF, CERAMIC DISC	6360-6
C-31	0.01μF, CERAMIC DISC	6360-6
C-32	0.01μF, CERAMIC DISC	6360-6
C-33	400, SILVER MICA	6359-21
C-34	25μF, 25V, ELECTROLYTIC	6355-4
C-35	25μF, 25V, ELECTROLYTIC	6355-4
C-36	400, SILVER MICA	6359-21
C-37	1000, CERAMIC FEED THRU	6356-2
C-38	500, CERAMIC FEED THRU	6356-1
C-39 THRU C-45	8.2, CERAMIC (TUBULAR)	6361-6
C-46	400, SILVER MICA	6359-21
C-47	1000, CERAMIC FEED THRU	6356-2

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
C-48	500, CERAMIC FEED THRU	6358-1
C-49	1000, CERAMIC (TUBULAR)	6361-25
C-50	1000, CERAMIC (TUBULAR)	6361-25
C-51	1000, CERAMIC (TUBULAR)	6361-25
C-52	0.22μF, 50V, MYLAR	6411-1
C-53	0.22μF, 50V, MYLAR	6411-1
C-54	1000, CERAMIC (TUBULAR)	6361-25
C-55	1000, CERAMIC (TUBULAR)	6361-25
C-56	1000, CERAMIC (TUBULAR)	6361-25
C-57	0.22μF, 50V, MYLAR	6411-1
C-58	0.22μF, 50V, MYLAR	6411-1
C-59	100, SILVER MICA	6359-8
C-60	33, CERAMIC (TUBULAR)	6361-13
C-61	390, SILVER MICA	6359-19
C-62	0.02μF, CERAMIC DISC	6370-7
C-63	1000, 75V, CERAMIC DISC	6360-1
C-64	0.01μF, CERAMIC DISC	6360-6
C-65	FACTORY SELECTED	
C-66	0.005μF, CERAMIC DISC	6360-5
C-67 THRU C-76	1000, CERAMIC FEED THRU	6356-7
C-77	500, CERAMIC FEED THRU	6356-1
C-78 THRU C-81	USED FOR ADDITIONAL CRYSTAL POSITIONS	
C-82 THRU C-84	1000, CERAMIC DISC	6360-1
D-1 THRU D-4	1N294 GERMANIUM DIODE	6357-5
D-5 & D-6	G7C SILICON RECTIFIER	6357-4
D-7 THRU D-10	1N294 GERMANIUM DIODE	6357-5
I-1 THRU I-4	LIGHT INDICATOR #44	249
J-1	BINDING POST	257
J-2	JACK, UG-185/U	204
J-3	BINDING POST	257
J-4	JACK 46000	4235
L-1	SATURABLE REACTOR	4600
L-2 A & B	COIL, SPECIAL	L2/5040N1F
L-3 A & B	" "	L3/5040N1F
L-4 A & B	" "	L4/5040N1F
L-5 A & B	" "	L5/5040N1F
L-6 A & B	" "	L6/5040N1F
L-7 A & B	" "	L7/5040N1F
L-8	RF CHOKE 30 MH	6394-2
L-9 A & B	COIL, SPECIAL	L9/5040N1F
L-10 A & B	" "	L10/5040N1F
L-11 A & B	" "	L11/5040N1F
L-12 A & B	" "	L12/5040N1F
L-13 A & B	" "	L13/5040N1F
L-14 A & B	" "	L14/5040N1F
L-15	FILAMENT CHOKE 12 UH	6394-1
L-16	COIL, SPECIAL	L16/5040N
L-17	" "	L17/5040N1F
L-18	" "	L18/5040N1F
L-19	" "	L19/5040N1F
L-20	" "	L20/5040N1F
L-21	" "	L21/5040N1F
L-22	" "	L22/5040N1F
L-23 THRU L-26	USED FOR ADDITIONAL CRYSTAL POSITIONS	
L-27 THRU L-29	FILAMENT CHOKE 12 UH	6394-1
P-1	PLUG, P-308-CCT	453
P-2	PLUG, P-302-CCT	4112
P-3	NOT USED	
P-4	PLUG, 45025	6600

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
	RESISTORS: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)	
R-1	100 K	1041-E
R-2	100 K	1041-E
R-3	470 K	4741-E
R-4	8.2 K	8221-E
R-5	3.9 K	3921-E
R-6	1 M	1051-E
R-7	10 K, 2 WATT	1031-H
R-8	680 K	6841-E
R-9	500 K, 2 WATT POT, VARIABLE	126
R-10	220 K	2241-E
R-11	100 K, 2 WATT POT, VARIABLE	121
R-12	3.3 M	3351-E
R-13	100 K	1041-E
R-14	100 K	1041-E
R-15	3.3 M	3351-E
R-16	150 K	1541-E
R-17	150 K	1541-E
R-18	1.2 M	1251-E
R-19	330 K	3341-E
R-20	500 K, 2 WATT POT, VARIABLE	126
R-21	240, 5% TOLERANCE	2415-E
R-22	33 K, 1 WATT	3331-G
R-23	56 K, 1 WATT	5631-G
R-24	15 K, ¼ WATT	1531-C
R-25	15 K, ¼ WATT	1531-C
R-26	39 K	3931-E
R-27	270 K	2741-E
R-28	2.2 K	2221-E
R-29	10 K, 2 WATT POT, VARIABLE	108
R-30	510, 5% TOLERANCE	5115-E
R-31	560	5611-E
R-32	1 K	1021-E
R-33	330	3311-E
R-34	15 K, 2 WATT	1531-H
R-35	15 K, 2 WATT	1531-H
R-36	10 M	1061-E
R-37 THRU R-50	FACTORY SELECTED	
R-51	300, 5% TOLERANCE	3015-E
R-52 THRU R-57	330	3311-E
R-58	47 K	4731-E
R-59	1.2 M	1251-E
R-60	2.2 K	2221-E
R-61	100 K, ¼ WATT	1041-C
R-62	47, ¼ WATT	4701-C
R-63	85.6, ¼ WATT, 1% TOLERANCE	6558-25
R-64	345, ¼ WATT, 1% TOLERANCE	6558-41
R-65	85.6, ¼ WATT, 1% TOLERANCE	6558-25
R-66	134.8, ¼ WATT, 1% TOLERANCE	6558-31
R-67	100, ¼ WATT, 1% TOLERANCE	6558-26
R-68	134.8, ¼ WATT, 1% TOLERANCE	6558-31
R-69	409, ¼ WATT, 1% TOLERANCE	6558-42
R-70	24.7, ¼ WATT, 1% TOLERANCE	6558-13
R-71	409, ¼WWATT, 1% TOLERANCE	6558-42
R-72	10 M	1061-E
R-73	FACTORY SELECTED	
R-74 A & B	50K/50K, 2 WATT DUAL POT, VARIABLE	77
R-75	FACTORY SELECTED	
R-76	3.3 M	3351-E
R-77	150 K	1541-E
R-78	15 K	1531-E
R-79	51 K	5131-E
R-80	12 K	1231-E
R-81	470 K	4741-E
R-82	27	2701-E
R-83	27	2701-E
R-84	1 K, 5 WATT	1021-J
R-85	15 K, ¼ WATT	1531-C
R-86	15 K, ½ WATT	1531-C
R-87	100 K	1041-E
R-88	100 K	1041-E
R-89	100 K	1041-E

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
R-90	1 K	1021-E
R-91	1 K	1021-E
R-92	100 K	1041-E
R-93	240, 5% TOLERANCE	2415-E
R-94 THRU R-99	330	3311-E
R-100	100 K, 2 WATT POT, VARIABLE	121
R-101	300, 5% TOLERANCE	3015-E
R-102	FACTORY SELECTED	
R-103	FACTORY SELECTED	
R-104	220 K	2241-E
R-105	680, 1 WATT	6811-G
R-106	300, 5% TOLERANCE	3015-E
R-107	1 K	1021-E
R-108 THRU R-116	FACTORY SELECTED	
R-117	120 K	1241-E
R-118	240, 5% TOLERANCE	2415-E
R-119	100 K	1041-E
R-120	100 K	1041-E
R-121	240, 5% TOLERANCE	2415-E
R-122	100 K	1041-E
R-123	470	4711-E
R-124	470	4711-E
R-125	500 K, 2 WATT POT, VARIABLE	126
R-126	240, 5% TOLERANCE	2415-E
R-127	62 K, 5% TOLERANCE	6235-E
R-128	100 K	1041-E
R-129	100 K	1041-E
R-130	240, 5% TOLERANCE	2415-E
R-131	100 K	1041-E
R-132	470	4711-E
R-133	470	4711-E
R-134	100 K	1041-E
R-135	200 K, 5% TOLERANCE	2045-E
R-136	39 K	3931-E
R-137	10 K, 2 WATT POT, VARIABLE	108
R-138	10 K	1031-E
R-139	47 K, 1 WATT	4731-G
R-140	100 K, 2 WATT POT, VARIABLE	121
R-141 THRU R-143	47 K	4731-E
R-144	20 K, 5% TOLERANCE	2035-E
R-145 THRU R-151	FACTORY ADJUSTED	
R-152 THRU R-155	USED FOR ADDITIONAL CRYSTAL POSITIONS	
R-156	4.7 K, 2 WATT	4721-H
S-1 A,B,C,D	SWITCH, ROTARY, 6 POSITION	5217
S-2	SWITCH, TURRET, 6 POSITION	5218
S-3 THRU S-5	SWITCH, TOGGLE, DPDT	254-T
S-6 THRU S-12	SWITCH, TOGGLE, DPDT	254-TX
S-13 THRU S-16	USED FOR ADDITIONAL CRYSTAL POSITIONS	
S-17	SWITCH, SPST, TOGGLE	255-C
S-18	SWITCH, DPDT, TOGGLE	254-C
V-1	TUBE, 5963	5963
V-2	TUBE, 6J6	6J6
V-3	TUBE, 6V6	6V6
V-4 THRU V-6	TUBE, 5718	5718
V-7	TUBE, 12AT7	12AT7
V-8 & V-9	TUBE, 6AU6	6AU6
V-10	TUBE, 6BK7	6BK7
V-11	TUBE, OA2	OA2
V-12 & V-13	TUBE, 12AU7	12AU7
V-14	TUBE, 12AT7	12AT7
V-15	TUBE, 5718	5718
Y-1 THRU Y-7	QUARTZ CRYSTALS	
	ATTENUATOR (COMPLETE)	5215
	UNCALIBRATED DIALS (S-1-S-2)	4822
	ROUND KNOBS (DOTTED)	1426-D
	LARGE KNOBS	2961
	SMALL KNOBS	2962
	HANDLES	4117-2

6-3 PARTS LIST, VARI-SWEEP MODEL RADAR.

The VARI-SWEEP MODEL RADAR is the same as the VARI-SWEEP MODEL IF except for the following –

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
C-12 A & B	VARIABLE	5225
C-27	10, 500V, 10%	6361-28
C-28	10, 500V, 10%	6361-28
C-29 A & B	VARIABLE	5441
L-2 A & B	COIL, SPECIAL	L2/5040NRA
L-3 A & B	" "	L3/5040NRA
L-4 A & B	" "	L4/5040NRA
L-5 A & B	" "	L5/5040NRA
L-6 A & B	" "	L6/5040NRA
L-7 A & B	" "	L7/5040NRA
L-9 A & B	" "	L9/5040NRA
L10 A & B	" "	L10/5040NRA
L11 A & B	" "	L11/5040NRA
L12 A & B	" "	L12/5040NRA
L13 A & B	" "	L13/5040NRA
L14 A & B	" "	L14/5040NRA

6-4 PARTS LIST, VARI-SWEEP MODEL RADAR CAT. 865AW.

The listing of replaceable parts for MODEL IF applies to MODEL RADAR, CATALOG 865-AW, except for the following omissions and additions.

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
C-12 A & B	VARIABLE	5441
C-27 & C-28	10, CERAMIC (TUBULAR)	6361-28
C-29 A & B	VARIABLE	5441
C-38	500, CERAMIC FEED THRU	6356-1
C-39 THRU C-45	NOT USED	
C-47	NOT USED	
C-63	500, CERAMIC FEED THRU	6356-1
C-77	1000, 75V, CERAMIC DISC	6360-1
C-78 THRU C-81	NOT USED	
C-82	10μF, 150V, ELECTROLYTIC	6355-42
C-83 THRU C-85	0.5μF, 200V, METALIZED	6354-7
C-86	0.1μF, 75V, CERAMIC DISC	6360-17
C-87 & C-88	1000, CERAMIC FEED THRU	6356-2
L-2 A & B	COIL, SPECIAL	L2/5427-H
L-3 A & B	" "	L3/5427-H
L-4 A & B	" "	L4/5427-H
L-5 A & B	" "	L5/5427-H
L-6 A & B	" "	L6/5427-H
L-7 A & B	" "	L7/5427-H
L-8 A & B	" "	L8/5427-H
L-9 A & B	" "	L9/5427-H
L10 A & B	" "	L10/5427-H
L11 A & B	" "	L11/5427-H
L12 A & B	" "	L12/5427-H
L13 A & B	" "	L13/5427-H
L14 A & B	" "	L14/5427-H

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
L-16	COIL, SPECIAL, SLUG-TUNED	
L-17	" " "	L16/5427-H
L-18	" " "	L17/5427-H
L-19	" " "	L18/5427-H
L-20	" " "	L19/5427-H
L-21	" " "	L20/5427-H
L-22	" " "	L21/5427-H
L-23	" " "	L22/5427-H
L-24	" " "	L23/5427-H
L-25	" " "	L24/5427-H
L-26	" " "	L25/5427-H
L-28	" " "	L26/5427-H
L-29	" " "	L28/5427-H
L-30	" " "	L29/5427-H
L-31	" " "	L30/5427-H
L-32	" " "	L31/5427-H
L-33	FILAMENT CHOKE "	L32/5427-H
L-34	" "	6394-1
		6394-1
R-5	3.9 K	3931-E
R-62	47 K, $\frac{1}{4}$ WATT	4731-C
R-92	100 K	1021-E
R-93	240, 5% TOLERANCE	2415-E
R-145 THRU R-158	FACTORY SELECTED	
R-159	270 K	2741-E
R-160	2.7 K	2721-E
R-161	4.7 K	4721-E
R-162	220 K	2241-E
R-163	3.3 K	3321-E
R-164	6.8 K	6821-E
R-165	2.2 M	2251-E
R-166	560 K	5641-E
R-167	220 K	2241-E
R-168	4.7 K, 2 WATT	4721-H
S-6 THRU S-16	NOT USED	
S-19 A & B	SWITCH, 2 WAFER, 6 POSITION	6878
V-15	TUBE, 12AT7	12AT7
V-16	TUBE, 5718	5718
Y-1 THRU Y-16	CRYSTAL, QUARTZ	NO PART NO. SPECIFY BY FREQUENCY

6-5 PARTS LIST, MODEL 200 ASM-2 POWER SUPPLY.

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
	CAPACITORS:	
C-1	6μF, 600V, OIL-FILLED	1532
C-2	2μF, 600V, OIL-FILLED	333
C-3	0.1μF, 400V, MYLAR	6411-8
C-4 A & B	20/20μF, 450V, DUAL ELECTROLYTIC	6355-10
C-5	0.01μF, 500V, CERAMIC DISC	6360-6
C-6	1000μμF, 500V, CERAMIC	6361-25
D-1 THRU D-4	SILICON RECTIFIER F6	6357-3
F-1	FUSE, 3 AMP, 250V	245
F-2	FUSE, ¼ AMP, SLOW BLOW	467
J-1	SOCKET, S-308-AB	401
L-1	CHOKE, 8 HENRY	5501
P-1	A-C LINE CORD	328
	RESISTORS: (UNLESS OTHERWISE INDICATED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)	
R-1	330 K, 1 WATT	3341-G
R-2	33	3301-E
R-3	100	1011-E
R-4	33	3301-E
R-5	100	1011-E
R-6	33	3301-E
R-7	100	1011-E
R-8	100, 1 WATT	1011-G
R-9	100, 1 WATT	1011-G
R-10	100, 1 WATT	1011-G
R-11	270 K	2741-E
R-12	150 K, 1 WATT	1541-G
R-13	3.3 K, 1 WATT	3321-G
R-14	5.6 K, 2 WATT	5621-H
R-15	47 K	4731-E
R-16	50 K, 2 WATT POT, VARIABLE	118
R-17	330 K, 1 WATT	3341-G
T-1	TRANSFORMER (POWER)	5361
*T-2	TRANSFORMER (FILAMENT)	952
V-1	TUBE, 6AQ5	6AQ5
V-2	TUBE, 6AQ5	6AQ5
V-3	TUBE, 6AQ5	6AQ5
V-4	TUBE, 12AU7	12AU7
V-5	TUBE, 6AG5	6AG5
V-6	TUBE, OB2	OB2
V-7	TUBE, 5651	5651

* USED ONLY ON POWER SUPPLY MODEL 200 ASM-2

FOR UNITS WITH SERIAL NUMBERS BELOW 20898, THE FOLLOWING PARTS ARE USED.

D-1 THRU D-6	SILICON RECTIFIER M500	6357-2
F-2	NOT USED	
R-2, R-4, R-6	33, 1 WATT	3301-G
R-3, R-5, R-7	100, 1 WATT	1011-G

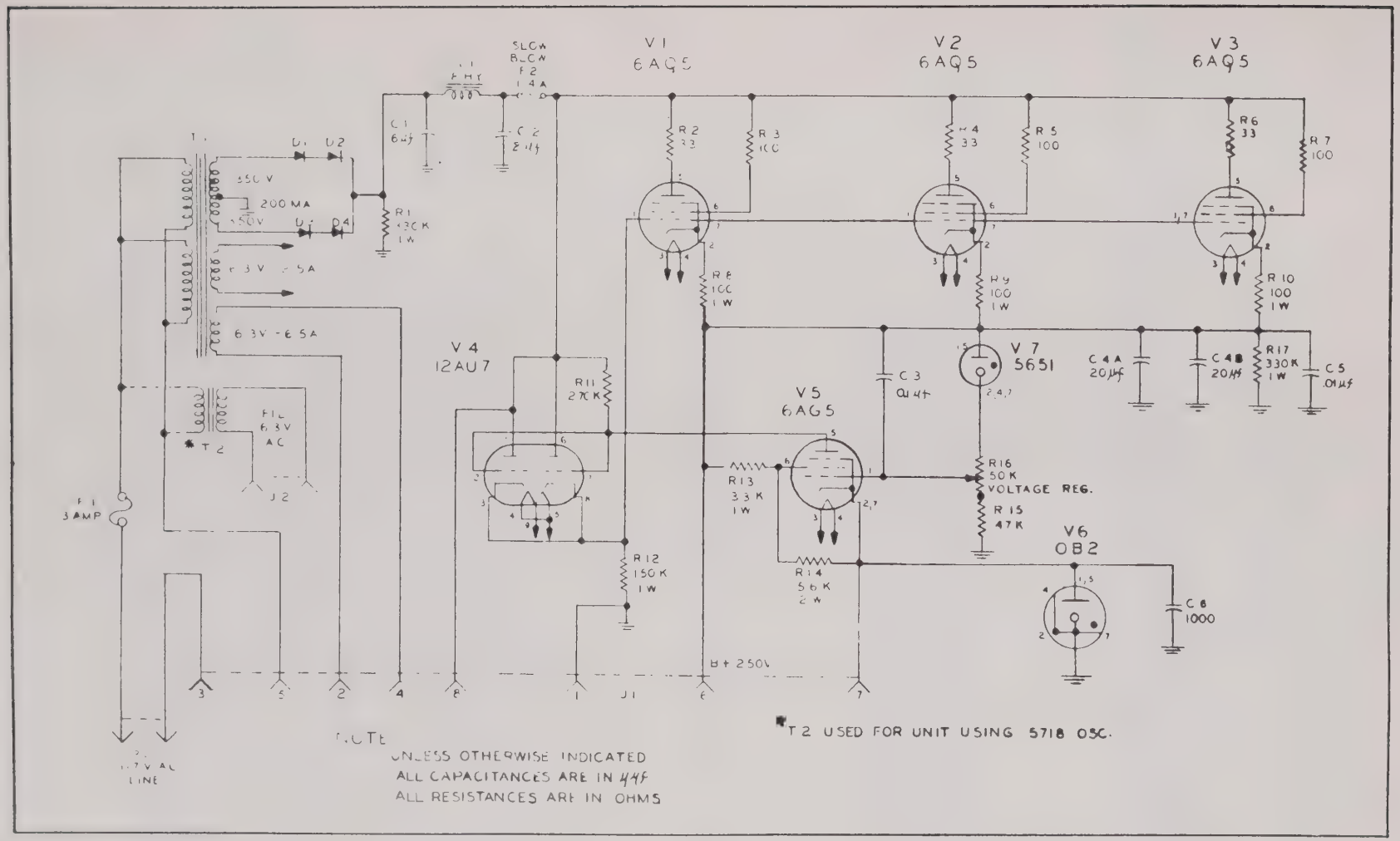


Fig. 6-3, Schematic Diagram KB-6273C, Model 200 ASM-2

May, 1963

ADDENDUM

VARI-SWEEP MODELS RADAR AND IF

This addendum covers changes made to the equipment for the purpose of narrowing the birdie-marker and reducing the pulling tendency of the c-w oscillator. These changes are incorporated in all units after Serial Number 26597. Reference should be made to Schematic KD-5040-Q.

Ref: Section 3-1, p.9.

Change VAR LEVEL (R-100) to read:

VAR LEVEL (R-100 & S-19)	Variable (on-off)	This control is used to vary the amplitude of the variable marker. When the control is pulled away from the panel, a switch is operated providing a narrower birdie-marker.

Ref: Section 3-3, p. 13.

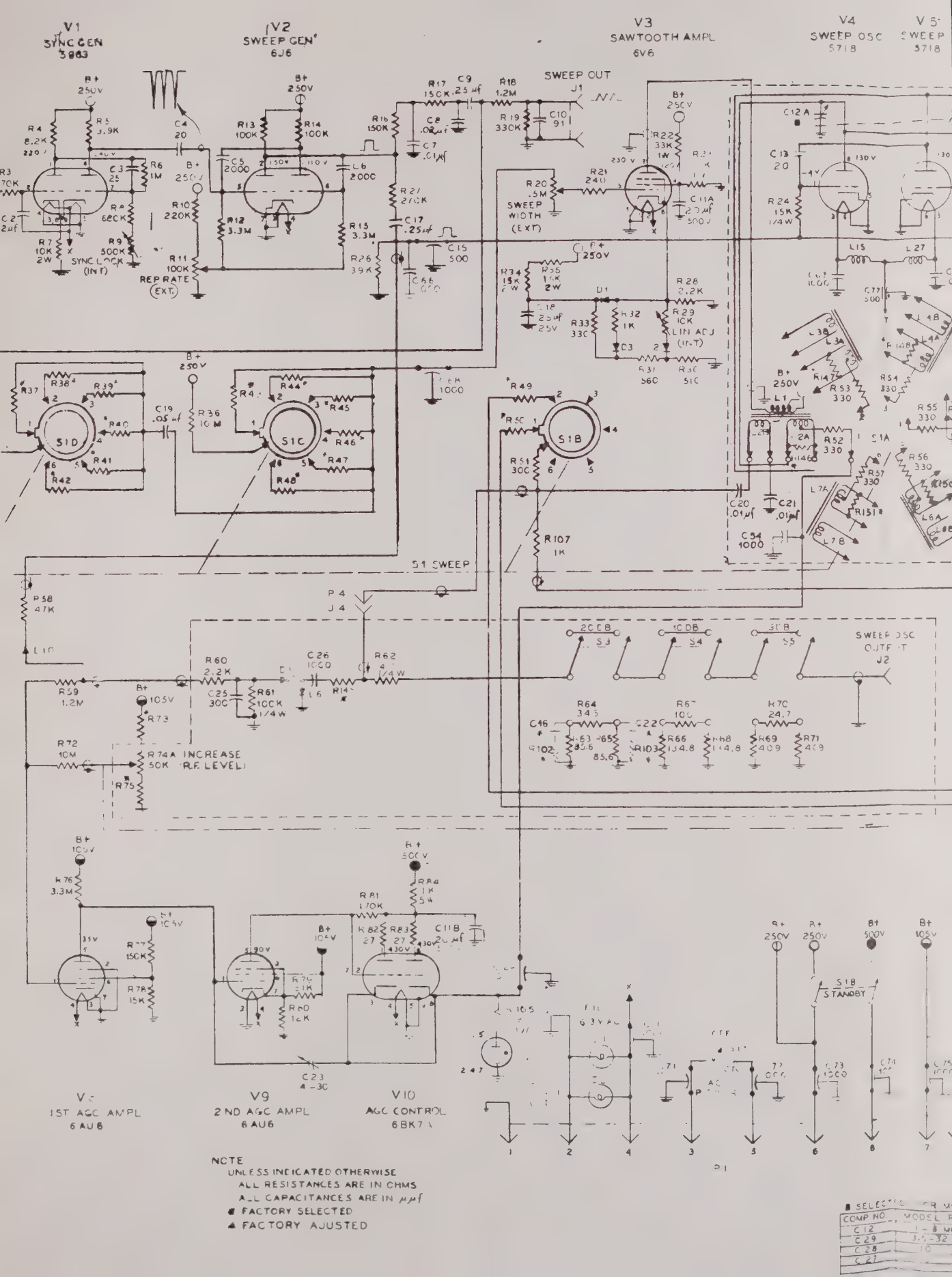
Add the following:

13. If a narrower variable birdie-marker is desired, pull the VAR LEVEL control away from the front panel.

Ref: Section 4-1E, p. 17.

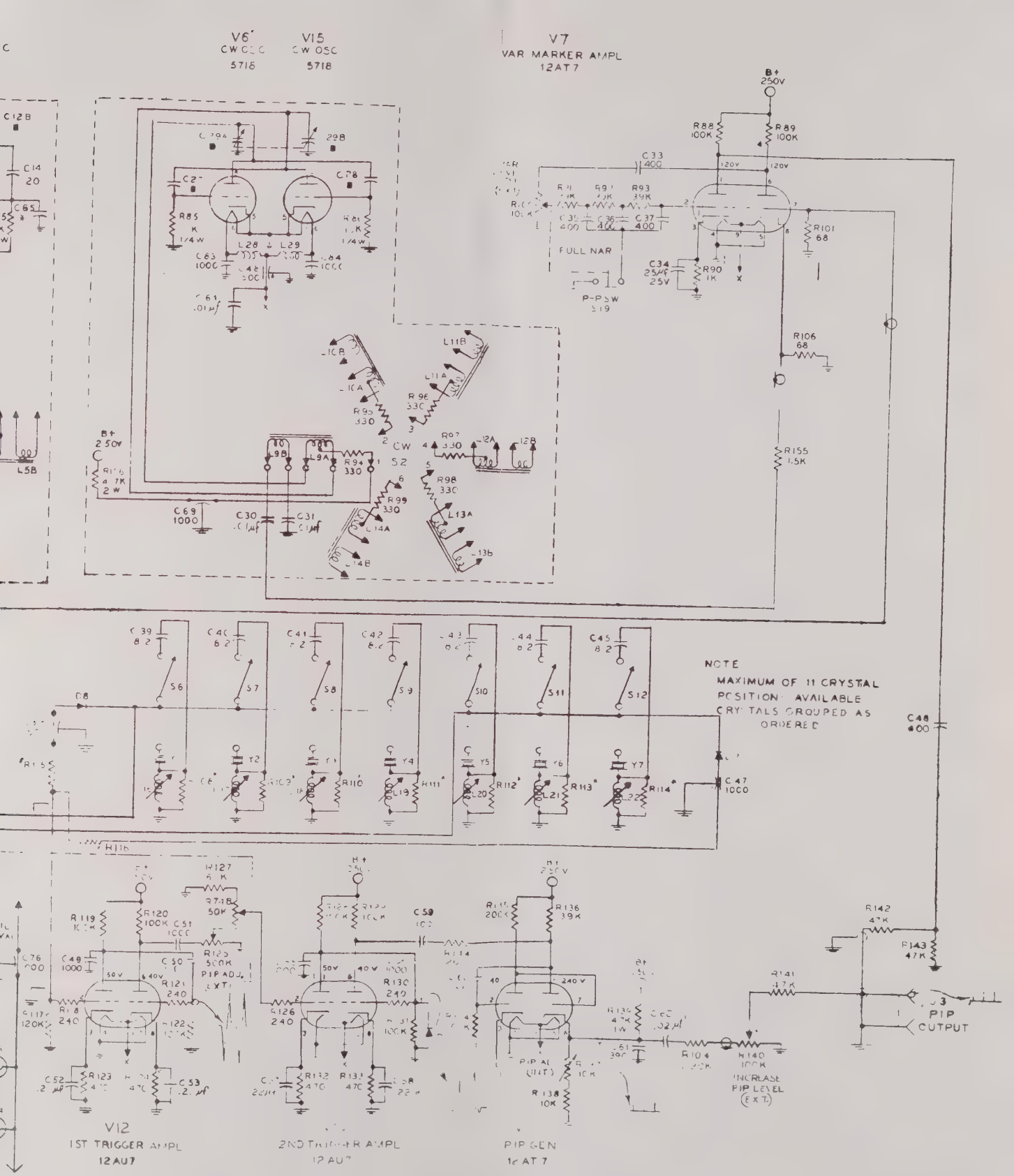
Change to read:

The variable marker is generated by a separate c-w oscillator (V-6 and V-15), which utilizes two 5718 triodes in a tuned-plate, push-pull configuration. Oscillator frequency is determined by the setting of the Band Selector (S-2) and by the Frequency Control capacitor (C-29). The output of this oscillator is fed to the cathode of the first half of the variable marker amplifier (V-7). An output from the sweep oscillators (V-4 and V-5) is fed into the grid of the same stage. In this stage, the signals are mixed and the resultant audio frequency burst is amplified. This output is then fed to the second half of the amplifier. The setting of the VAR LEVEL control determines the amount of signal which is fed to this second stage, controlling the amplitude of the variable marker. When the switch (S-19), which forms a part of this control, is closed, an R-C network, composed of R-91 thru R-93 and C-35 thru C-37, is connected in a filter configuration, narrowing the band width of the audio frequency burst. When the switch is open, this R-C network has a minimal effect on the input signal. The second stage of the variable marker amplifier operates as a straightforward audio amplifier.



NOTE
UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS
ALL CAPACITANCES ARE IN μμf
FACTORY SELECTED
▲ FACTORY AJUSTED

SELECTED FOR MODEL
COMP NO.
C12
C29
C28
C27



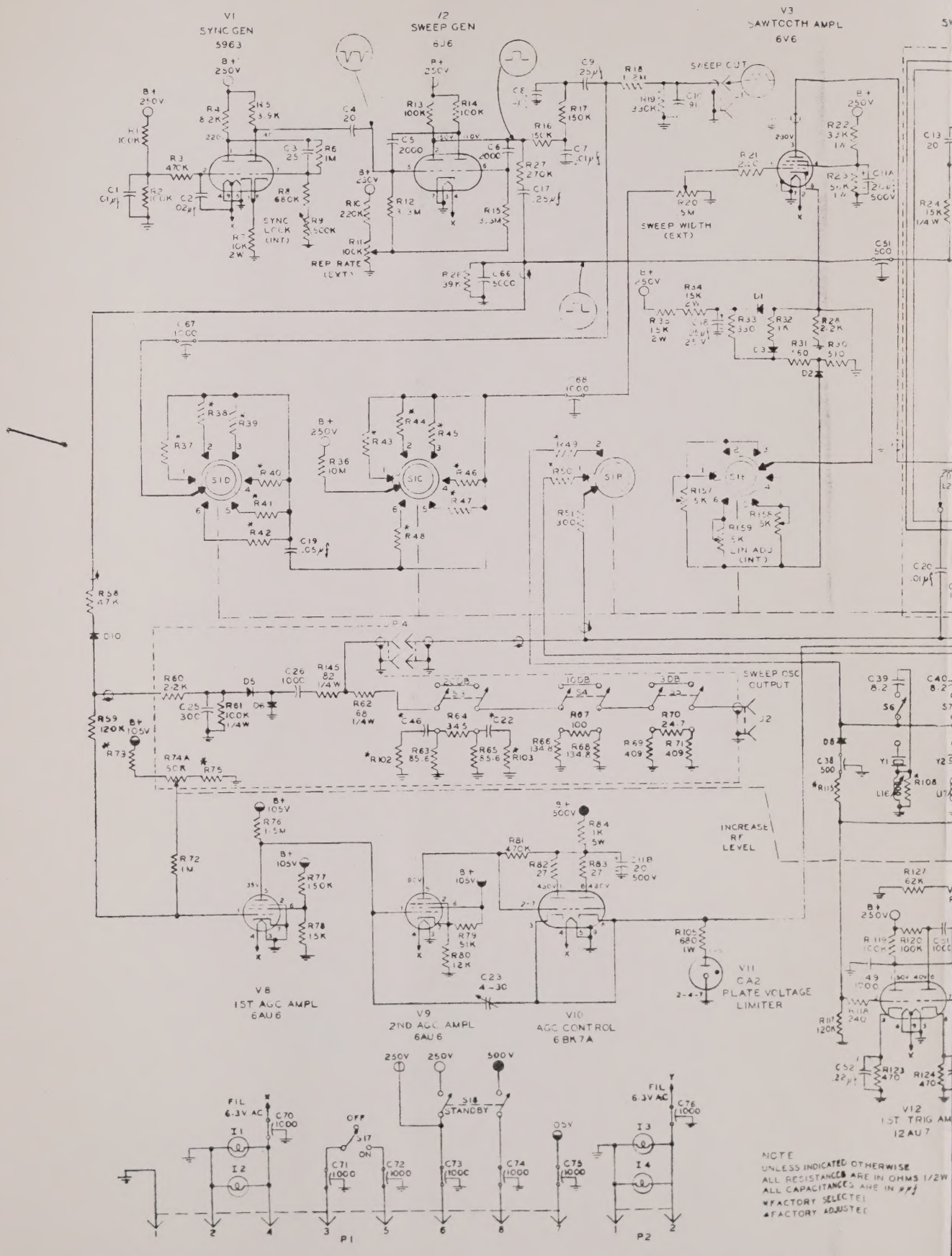
SCHEMATIC DIAGRAM VARI-SWEEP MOD. RADAR & IF

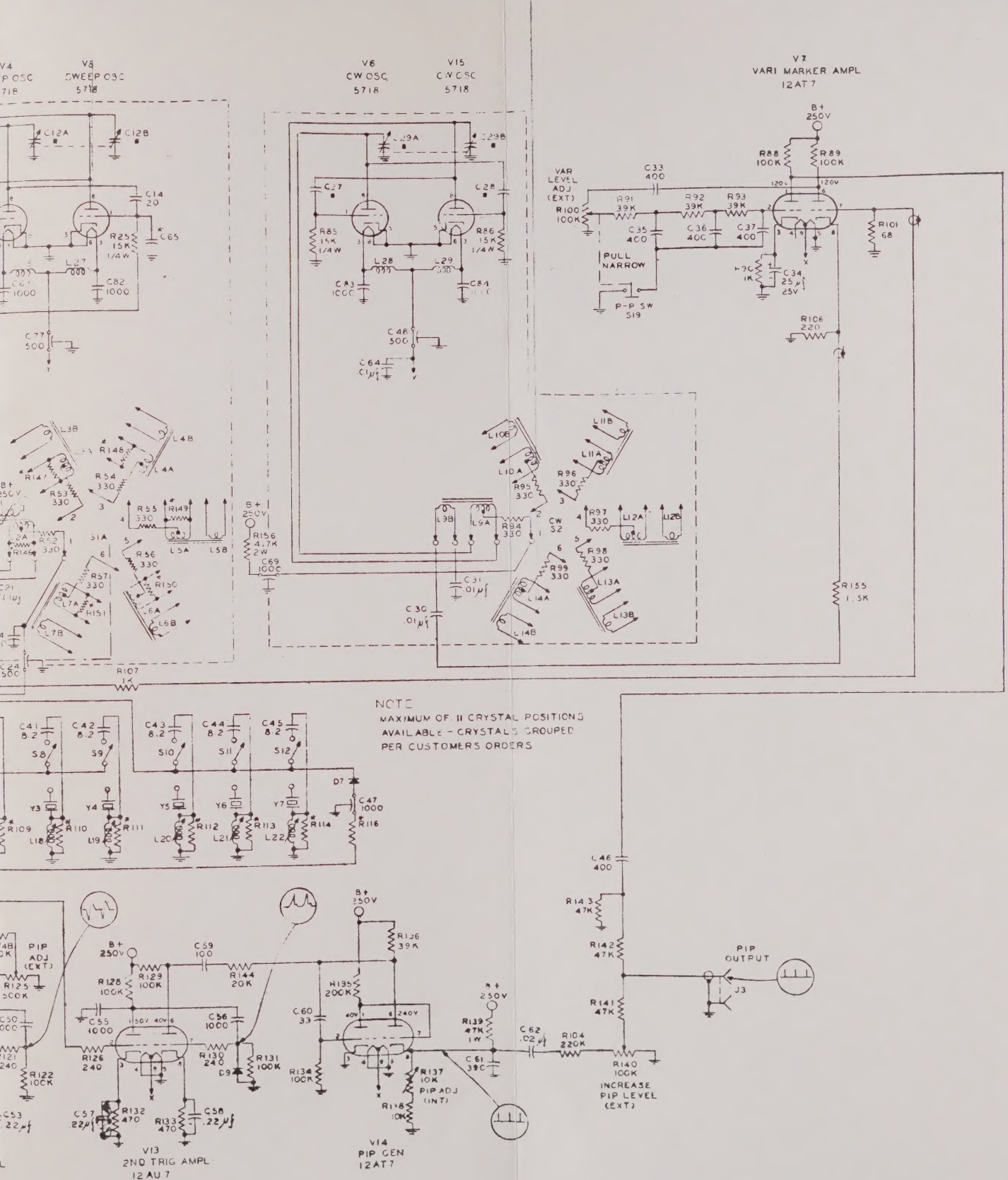
KD5040 Q

AUA 26598

AS LISTED

MODEL	IF

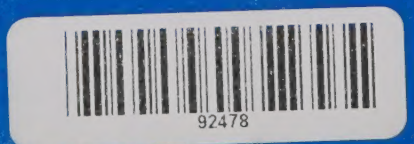

V1
SYNC GEN
5963
V2
SWEEP GEN
6J6
V3
SAWTOOTH AMPL
6V6
SWEEP CUT
SWEEP WIDTH (EXT)
REP RATE (EXT)
SYNC LOCK (INT)
SWEEP OSC OUTPUT
LIN ADJ (INT)
INCREASE RF LEVEL
V8
1ST AGC AMPL
6AU6
V9
2ND AGC AMPL
6AU6
V10
AGC CONTROL
6BK7A
V11
CA2
PLATE VOLTAGE LIMITER
V12
1ST TRIG AM
12AU7
STANDBY
OFF
ON
FIL 6.3V AC
P1
P2
NOTE
UNLESS INDICATED OTHERWISE
ALL RESISTANCES ARE IN OHMS 1/2W
ALL CAPACITANCES ARE IN µµf
*FACTORY SELECTED
*FACTORY ADJUSTED



*SELECT FOR MODEL AS LISTED

COMP NO	RADAR	IF
C12	1-8	3.5-32
C29	3.5-32	3.8-45
C28	10	6.8
C27	10	6.8

VARI SWEEP MODEL RADAR & IF DWG. NO. D504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